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Flathead National Forest (Mont.)
Multi Level Resource Information System users guide

MULTI LEVEL RESOURCE INFORMATION SYSTEM

USERS GUIDE

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INTRODUCTION:

The Flathead National Forest is using Geographic Information System (GIS), Remote Sensing (RS), and Image Processing (IP) technology to construct a Multi Level Resource Information System (MURIS). The combination of computer assisted GIS and RS satellite data provides spatial overlays necessary for analyzing multiple layers of information. Any number of planes may be combined with assigned parameters to produce a variety of map and tabular results. To balance timber wildlife and recreation management in an ecological and economical sound manner it is increasingly important that map and tabular information be readily available to resource managers.

Inventory, modeling, and monitoring are the three basic categories of the MURIS System. When digitally overlain, multiple data planes can be applied to inventory site-specific parameters, such as the distribution and abundance of species within a particular drainage.

The numerous layers of resource data can be modeled to develop new layers such as an old growth layer or a riparian area layer. These modeling techniques can be used for site-specific management decisions on District projects.

Monitoring would be a main concern in implementation of the Forest Plan utilizing spatial data technology. This is accomplished by two methods: 1) data management and updates of map features, and; 2) using remote sensing technology. This technology is used to monitor vegetation changes, natural or man caused, over time.

The majority of the 20 existing layers were created by digitizing from various resource maps. The numonics Model 2400 coordinate digitizer was used which is connected on-line to the Data General computer. Digitizing was done on a quad by quad basis for each layer. Edge matching between quads was performed to assure continuity of the map surface. The digitized feature can be polygon, line, or point data.

Line segments were recorded in tablet inches and then converted to UTM coordinates. The UTM coordinates were then converted to image coordinates. This tranforms the map from vector coordinates (line segments) to rastor coordinates (image). Once in rastor format, image processing operations are applied to attach attributes, thus giving the GIS layer it's informational character.

SYSTEM ACCESS:

Drawer: MURIS
Folder: APP
Command: ERDAS

When a user is logged into ERDAS system you reside on a working disk with many users. Data files do not exist in this working area. Data files are currently stored on tape. Files need to be loaded off the tape onto the working disk. The MURIS staff will do this for the user. In the near future, most data files will be stored in a condensed format on the system. The following command will move the needed data files to the working area.

Command: ACCESS

The program moves the condensed file into the working area with the option of moving the full data set or a subset of the data.

FILE MANAGEMENT:

Size of files: To save disk space and increase processing speed, files should be kept at a minimum size. For example; a file on the Hungry Horse District contains 1652736 bytes for a file that is 1400 columns, 1180 rows. If an application is being run on a portion of the district, i.e. and analysis area, reduce the size of the files to fit the size of the analysis area. This is done by using upper left and lower right coordinates of the area being used. Coordinates have been provided for analysis areas and timber compartments, and are in the enclosed documentation. Additionally coordinates can obtained from the district map and gridded overlay in Appendix A. This will reduce the size of the files being saved and increase processing time by 90%.

Deleting files: Temporary files should be deleted as soon as they are no longer needed. Files created on jobs that "bombed out" should be deleted immediately. Be careful when using the "wildcard" (+) when deleting files, it could wipe out a day(s) work. It is very easy to build and save many files for each project. If the file is not needed for the project, delete it. File space is limited, you could find yourself and all other users out of space in a short time. For example, two typical Hungry Horse data files to be used in an overlay process will require 9,600 blocks (4.8 million bytes).

Naming files: Files should be named using abbreviations that are easily traced to the project and type of file created. For example, all files belonging to the Hungry Horse data sets begin with "HH". The analysis area data set for Hungry Horse is named "HHAA". This same naming convention should be carried over to the project level. Files created for the Anna Lid analysis area would start with "AL" followed by abbreviation for the type of file. "ALRDBUF" for Anna Lid road buffer. It is highly recommended to maintain a notebook on the files created for each project.

Copying to tape: The MURIS staff will be responsible for loading and copying all files to tape. When a project is completed or will not be worked on for sometime, a backup tape will be made upon the user's request. Before backing up a project the user must clean up all files for the project - delete or rename if necessary.

MURIS DATA DICTIONARY

HUNGRY HORSE RANGER DISTRICT

Listed below are the separate GIS layers on the Flathead National Forest. Also listed are the filename, attribute identifier, and description of each attribute:

ADMIN BOUNDARIES-----(HHADM)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
1	GREAT BEAR WILDERNESS
4	CORAM EXPERIMENT FOREST
6	JEWEL BASIN HIKING AREA

Data Source - Digitized at 1:24000 scale from USGS quad maps. Compiled 1/89.

ANALYSIS AREAS-----(HHAA)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME	DATA FILE COORDINATES	
		Upper Left	Lower Right
1	LKFIV1	172,25	343,199
2	LKFIV2	136,163	316,403
3	LKFIV3	79,1	295,337
4	EMERY1	262,127	412,319
5	EMERY2	205,256	385,436
6	EMERY3	325,256	502,427
7	EMERYW	385,223	550,430
8	MIDFO1	301,22	739,457
9	MIDFO2	607,346	829,607
10	MIDFO3	763,508	1147,679
11	MIDFOW	310,40	1156,730
12	FIREF	274,361	499,541
13	PAINT1	445,412	634,688
14	PAINT2	505,646	691,817
15	PAINTW	472,400	727,799
16	COLUM	1,253	205,607

*Filename in MURIS System

ANALYSIS AREAS-----(HHAA)* con't

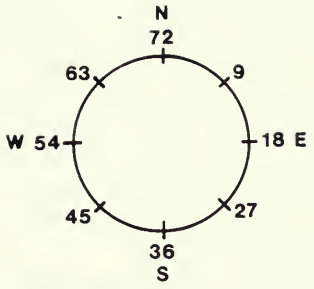
ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME	DATA FILE COORDINATES	
		Upper Left	Lower Right
17	WOUND1	55,385	259,598
18	WOUND2	130,451	277,655
19	WOUND3	172,439	349,706
20	WOUNDJ	244,670	331,748
21	ANNA1	286,490	439,721
22	ANNA2	364,607	538,820
23	ANNAJ	310,679	385,745
24	GRAVE1	337,730	574,967
25	GRAVE2	331,943	553,1096
26	GRAVE3	439,841	670,1090
27	GRAVEJ	277,700	439,964
28	BAPT1	574,775	763,970
29	GRTBRW	688,685	1153,1080
30	SKYLA1	1096,463	1276,625
31	SKYLA2	1072,580	1315,796
32	SKYLA3	1213,601	1360,835
33	SKYLAW	1030,757	1360,883
34	RESERVOIR	175,355	691,1051

Data Source - Digitized at 1:24000 scale from various sources. Compiled 6/88.

*Filename in MURIS System

ASPECT DATA-----(HHASP)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
0	FLAT
1	5 DEG
2	10 DEG
3	15 DEG
.	.
.	.
72	360 DEG



Data Source - Derived from digital elevation data at 1:250000 scale. Created 1984.

Note: Attribute identifier equals aspect in degress divided by 5.

DISTRICT BOUNDARY-----(HHDIST)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
0	OUTSIDE DISTRICT
1	WITHIN DISTRICT

Data Source - Digitized at 1:24000 scale. Current as of 1/89.

ELEVATION DATA-----(HHELE)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
1	40 Feet Above Sea Level (FT ASL)
2	80 FT ASL
3	120 FT ASL
.	.
.	.
75	3000 FT ASL
255	10200 FT ASL

Data Source - Derived from DMA (Defense Mapping Agency) at 1:250000 scale at 200' intervals then recalculated to 40' intervals. Accuracy is to 1:250000 scale. Created 1984.

*Filename in MURIS System

FISHERIES POINT SURVEY DATA-----(HHFPT)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
0	BACKGROUND
1	FISH BARRIER
2	BEAVER DAMS
3	FALLS BARRIER
4	CORING SITES
5	FISH JOLT
6	JUNC REACH 1 & 2
7	JUNC REACH 3 & 4
8	JUNC REACH 1 & 2 WITH FISH JOLT
9	JUNC REACH 2 & 3

Data Source - Digitized at 1:24000 scale. Derived from Flathead River Basin Study. Standard fisheries surveys compiled by Hank Dawson from 1978 to current. Current as of 6/88.

FISHERIES REACH SURVEY DATA-----(HHFRH)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
0	BACKGROUND
1	REACH 1
2	REACH 2
3	REACH 3
4	REACH 4
5	BULL TROUT 1
6	BULL TROUT 2
7	BULL TROUT 1 REACH 1
8	BULL TROUT 1 & REACH 2
9	BULL TROUT 1 & REACH 3
10	BULL TROUT 2 & REACH 2
11	BULL TROUT 2 & REACH 3
12	CUT TROUT
13	CUT TROUT & REACH 1
14	CUT TROUT & REACH 2
15	CUT TROUT & REACH 3
16	CUT TROUT & REACH 4

Data Source - Digitized at 1:24000 scale. Derived from Flathead River Basin Study. Standard fisheries surveys compiled by Hank Dawson from 1978 to current. Current as of 6/88.

*Filename in MURIS System

LANDTYPES-----(HHLT)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME	ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
1	WILDERNESS	25	26G-7
2	LAKES	26	26J-7
3	RESERVOIR	27	26J-8
4	10-2	28	26J-9
5	10-3	29	26L-7
6	12	30	26L-8
7	14-2	31	27-7
8	14-3	32	27-8
9	16	33	28-1
10	17	35	31
12	21-7	36	32
13	21-8	38	54
14	21-9	39	55
15	23-7	41	57-8
16	23-8	42	57-9
17	24-8	43	72
18	24-9	44	73
19	26A-8	45	74
20	26A-9	46	75
21	26C-7	47	76
22	26C-8	48	77
23	26C-9	49	78
24	26D-8		

Data Source - Digitized at 1:63360 scale from Flathead Country Land System Inventory. The Flathead National Forest Land System Inventory is a reconnaissance level soil inventory (SCS order III soil survey), developed for forest planning and environmental analysis needs. Mapping units were designed to display opportunities for management as well as constraints and limitations of the land for various uses. The original mapping was done at 1 inch/mile scale, with the filed work being completed in 1983. At this scale inclusions of dissimilar soils as large as 10 acres were allowed in the mapping units. Site specific projects should have on the ground review of this information. Compiled 6/88.

*Filename in MURIS System

MANAGEMENT AREAS-----(HHMA)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME	ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
1	MGT 2A	15	MGT 15
2	MGT 2B	16	MGT 15A
3	MGT 2C	17	MGT 15B
4	MGT 3	18	MGT 16
5	MGT 4	19	MGT 16A
6	MGT 5	20	MGT 16B
7	MGT 7	21	MGT 17
8	MGT 8	22	MGT 18
9	MGT 9	23	MGT 19
10	MGT 10	24	MGT 13D
11	MGT 12	25	MGT PVT
12	MGT 13	26	WILDERNESS
13	MGT 13A	27	HH RESERVOIR
14	MGT 14		

Data Source - Digitized at 1:24000 scale from Forest Plan Management Area map. Management area is an aggregation of capability areas which have common management direction. Consists of a grouping of capability areas selected through evaluation procedures used to locate decisions and resolve issues and concerns. Compiled 1/89.

*Filename in MURIS System

OWNERSHIP-----(HHOWN)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
1	PRIVATE
2	FOREST SERVICE

Data Source - Digitized at 1:24000 scale from USGS quads. Derived from Land Status Records. Compiled 6/88. Revised 2/89.

PRECIPITATION-----(HHPRCIP)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
10	10 INCHES OF PRECIPITATION
20	20 INCHES OF PRECIPITATION
30	30 INCHES OF PRECIPITATION
40	40 INCHES OF PRECIPITATION
50	50 INCHES OF PRECIPITATION
60	60 INCHES OF PRECIPITATION
70	70 INCHES OF PRECIPITATION
80	80 INCHES OF PRECIPITATION
90	90 INCHES OF PRECIPITATION

Data Source - The precipitation Isohyets are from precipitation maps prepared by Phil Farnes (1970) using U.S. Weather Bureau Data for valley precipitation and Soil Conservation Service data for mountain precipitation. The precipitation map is updated every five years and is being gradually modified to fit the 30-year cycle used the National Oceanic and Atmospheric Administration. The SCS maps were made at a scale of 1:250000. For purposed of digitizing precipitation/runoff data for MURIS, the precipitation maps were enlarged to 1:63360. This slightly influences the accuracy of the original information, but makes the precipitation/runoff data easier to use for forest activities. Compiled 3/88.

*Filename in MURIS System

ROADS-----(HHRDS)*

EXAMPLE OF ROAD RECTABLE FILE:

		EXISTING						PLANNED					
ATTRIBUTE IDENTIFIER	RD #	ES	LS	SU	FA	HU	WI	ES	LS	SU	FA	HU	WI
161	38	4	4	4	4	4	4	4	4	4	4	4	4
162	1048	1	2	2	1	1	1	11	11	11	11	11	11
163	1048	11	11	11	11	11	11	11	11	11	11	11	11
165	9341	51	51	51	51	51	51	51	51	51	51	51	51
168	1080	91	91	91	91	91	91	51	51	51	51	51	51
170	STL	3	4	4	4	3	2	2	2	2	2	2	2
173	119B	111	111	111	111	111	111	111	111	111	111	111	111

SEASON:

ES = EARLY SPRING
LS = LATE SPRING
SU = SUMMER
FA = FALL
HU = HUNTING SEASON
WI = WINTER

USE LEVELS:

1	0-1	UNIT/WEEK
2	2-5	
3	6-20	
4	21-100	
5	101-500	
6	500+	

ATTRIBUTE IDENTIFIER:

1-6	Use level, No Closure
11-16	Use level, Gate, Steel Round
21-26	Use level, Gate, Steel Square
31-36	Use level, Gate, Wood
41-46	Use level, Gate, Other
51-56	Use level, Phys Barr, Earth
61-66	Use level, Phys Barr, Concrete
71-76	Use level, Phys Barr, Post Rail
81-86	Use level, Post and Sign
91-96	Use level, Naturally Closed
111-116	Use level, Controlled By 1
121-126	Use level, Controlled By 2
131-136	Use level, Controlled By 3
141-146	Use level, Controlled By 4
151-156	Use level, Controlled By 5
161-166	Use level, Controlled By 6
171-176	Use level, Controlled By 7
181-186	Use level, Controlled By 8
191-196	Use level, Controlled By 9

Data Source - Digitized at 1:24000 scale from map and photo inventory by District Road System Managers. Current as of 1/89.

Note: The HHRD.RCT file contains road by road numbers, other owned roads, road use level, and road closure data which requires this file to be a 16 bite file. This means processing needs to be done before the file can be used in an application. A file with .RCT extension contains the attribute data and the first ten lines are text. The .RCT file is used to construct an image using program "RECTABLE". The above listing is a portion of the .RCT file. The user can access this file only by the command ROADS.

*Filename in MURIS System

SLOPE-----(HHSLOPE)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
0	FLAT
1	1 DEGREE (1.8% SLOPE)
2	2 DEGREE (3.5% SLOPE)
3	3 DEGREE (5.2% SLOPE)
4	4 DEGREE (7.0% SLOPE)
5	5 DEGREE (8.8% SLOPE)
6	6 DEGREE (10.5% SLOPE)
7	7 DEGREE (12.3% SLOPE)
8	8 DEGREE (14.1% SLOPE)
9	9 DEGREE (15.8% SLOPE)
10	10 DEGREE (17.6% SLOPE)
11	11 DEGREE (19.4% SLOPE)
12	12 DEGREE (21.3% SLOPE)
13	13 DEGREE (23.1% SLOPE)
14	14 DEGREE (24.9% SLOPE)
15	15 DEGREE (26.8% SLOPE)
16	16 DEGREE (28.7% SLOPE)
17	17 DEGREE (30.1% SLOPE)
18	18 DEGREE (32.5% SLOPE)
19	19 DEGREE (34.4% SLOPE)
20	20 DEGREE (36.4% SLOPE)
21	21 DEGREE (38.4% SLOPE)
22	22 DEGREE (40.4% SLOPE)
23	23 DEGREE (42.4% SLOPE)
24	24 DEGREE (44.5% SLOPE)
25	25 DEGREE (46.6% SLOPE)
26	26 DEGREE (48.8% SLOPE)
27	27 DEGREE (51.0% SLOPE)
28	28 DEGREE (53.2% SLOPE)
29	29 DEGREE (55.4% SLOPE)
30	30 DEGREE (57.7% SLOPE)
35	35 DEGREE (70.0% SLOPE)
40	40 DEGREE (83.9% SLOPE)
45	45 DEGREE (100.0% SLOPE)
50	50 DEGREE (119.2% SLOPE)
55	55 DEGREE (142.8% SLOPE)
60	60 DEGREE (173.2% SLOPE)
.	.
89	89 DEGREE

Data Source -Derived from DMA (Defense Mapping Agency) at 1:250000 scale. Created 1984.

Note: To convert percent slope to degrees: $(\tan)^{-1}$ of % value = degrees.

*Filename in MURIS System

STREAMS, LAKES, AND WATER CORRIDOR-----(HHWAT)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
0	BACKGROUND
1	1ST ORDER STREAMS, PERENNIAL
2	2ND ORDER STREAMS, PERENNIAL
3	3RD ORDER STREAMS, PERENNIAL
4	4TH ORDER STREAMS, PERENNIAL
5	5TH ORDER STREAMS, PERENNIAL
6	1ST ORDER STREAMS, INTERMITTENT
7	2ND ORDER STREAMS, INTERMITTENT
8	3RD ORDER STREAMS, INTERMITTENT
9	NOT USED
10	FLATHEAD RIVER
11	LAKES
12	LAKES INTERMITTENT
13	ISLANDS
14	HUNGRY HORSE RESERVOIR
15	MARSHES
16	GLACIERS
20	0-150 METER CORRIDOR
21	151-300 METER CORRIDOR
22	301-450 METER CORRIDOR
23	451-600 METER CORRIDOR
24	601-750 METER CORRIDOR
25	751-900 METER CORRIDOR
26	901-1050 METER CORRIDOR
27	1051-1200 METER CORRIDOR
28	1201 METER CORRIDOR AND ABOVE

Data Source - Digitized at 1:24000 scale. Classification by Forest Hydrologist. Compiled 6/88. Revised 2/89.

*Filename in MURIS System

SUB-BASIN BOUNDARIES-----(HHSUB)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME	ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
15	ABBOT CR	128	LONG CR W
28	ABBOTT SO FORK	59	MAGGIE CR
118	AENEAS CR	20	MARGARET CR
60	ALICE CR	120	MAZIE CR
37	ALPHA CR	71	MCINERNIE CR
72	ARGALL CR	88	MORRISON AB, PUZZLE CR
35	AURORA CR	101	MORRISON LOWER
130	BAKER CR	66	MURRAY CR
114	BEN CR	96	NATRONA CR
126	BERGERSHIRE CR	3	OUZEL CR
39	BETA CR	113	PAINT CR
138	BIGLOW CR	41	PAOLA CR
86	CANYON & DODGE CR	112	PEARL CR
21	CASCADILLA CR	33	PINNACLE CR
77	CHALLENGE CR	104	PUZZLE CR
116	CHARLIE CR	7	PYRAMID CR
91	CLAYTON CR	49	RESCUE & RIVERSIDE CR
89	CLORINDA CR	1	RESERVOIR AREA
19	CRYSTAL CR	27	SAND CR
117	CY CR	82	SHEEP CR
76	DEEP CR	94	SILVER STAIRCASE CR
12	DEERLICK CR	14	SKIUMA CR
87	DEVILS CR	62	SKYLAND CR
131	DEVILS CORKSCREW	52	SPRING MEADOW CR
56	DICKEY CR	105	SPRUCE CR
50	DORIS & MAMIE CR	24	STANTON CR
51	DORIS CR	70	TACK & MCDONALD CR
40	DUDLEY CR	54	TENT CR LOWER
108	ELK & DIRTY FACE CR	47	TENT CR UPPER
74	ELYA CR	31	TIGER CR
11	EMERGY CR	22	TIGER & TURMOIL CR
111	EMMA CR	139	TRAPPER CR
69	ESSEX CR	125	TRINITY CR
100	FANNORA CR	30	TUNNEL CR
107	FELIX CR	98	TWENTY-FIVE MILE CR
44	FIRE CR	17	WAHOO CR
79	FLOSSY CR	135	WHEELER CR LOWER
133	FOREST CR	136	WHEELER CR UPPER
73	GIEFER CR	78	WILDCAT CR
95	GOLDIE CR	64	WOUNDED BUCK CR LOWER
102	GRANITE CR	85	WOUNDED BUCK CR UPPER
109	GRAVES & ANENEAS CR	2	UNNAMED
122	GRAVES LOWER CR	4	UNNAMED
13	GREAT BEAR CR	6	UNNAMED

SUB-BASIN BOUNDARIES-----(HHSUB)* con't

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
73	GRIZZLY & GIEFER CR
99	HARRIS CR
137	HEINRUDE CR
129	HOKE CR
36	HUNGRY HORSE & MARGARET
34	HUNGRY HORSE LOWER
93	JAVA CR
127	JONES BELOW J.BASIN
132	JONES IN J.BASIN
106	KNIEFF CR
5	KOOTENAI CR
67	LID CR
115	LOGAN CR
123	LOGAN SO FK
53	LOST JOHNNY CR
124	LONG CR E.

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
9	UNNAMED
10	UNNAMED
16	UNNAMED
18	UNNAMED
26	UNNAMED
29	UNNAMED
32	UNNAMED
38	UNNAMED
46	UNNAMED
48	UNNAMED
55	UNNAMED
58	UNNAMED
63	UNNAMED
83	UNNAMED
84	UNNAMED
90	UNNAMED
103	UNNAMED
110	UNNAMED
121	UNNAMED
134	UNNAMED

Data Source - Digitized at 1:24000 scale. Classification by Forest Hydrologist using watershed boundaries delineated on topographic maps. Current as of 6/88.

*Filename in MURIS System

TIMBER COMPARTMENTS-----(HHCOMP)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME	DATA FILE COORDINATES	
		Upper Left	Lower Right
1	601-1	7,265	187,394
2	602-1	10,328	97,445
3	603-1	1,424	127,601
4	604-1	61,352	211,481
5	605-1	127,388	268,505
6	605-2	67,442	196,532
7	605-3	70,445	265,601
8	606-1	139,445	268,615
9	606-2	154,451	280,658
10	607-1	148,448	328,679
11	607-2	226,508	352,721
12	608-1	286,487	361,643
13	608-2	319,511	427,646
14	608-3	310,580	436,709
15	609-1	319,601	448,754
16	609-2	397,622	526,750
17	611-1	394,673	547,829
18	611-2	376,733	550,880
19	612-1	346,787	493,943
20	613-1	415,838	619,958
21	613-2	334,913	610,1027
22	614-1	337,964	538,1111
23	616-1	574,916	655,1021
24	616-2	547,970	673,1090
25	616-3	451,958	610,1099
26	618-1	112,7	355,295
26	618-2	112,7	355,295
26	618-3	112,7	355,295
26	618-4	112,7	355,295
27	620-1	295,124	415,277
28	620-2	307,250	430,403
29	621-1	73,244	331,439
30	622-1	187,178	313,301
31	622-2	199,265	298,349
32	622-3	232,319	298,370
33	622-4	202,286	262,364
34	623-1	262,151	337,250
35	623-2	274,232	355,316

*Filename in MURIS System

TIMBER COMPARTMENTS-----(HHCOMP)* con't

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME	DATA FILE COORDINATES	
		Upper Left	Lower Right
36	623-3	274,289	337,391
37	625-1	364,277	496,385
38	625-2	424,358	544,520
39	626-1	274,352	430,511
40	626-2	337,364	502,550
41	628-1	460,502	586,607
42	630-1	478,565	628,688
43	631-1	535,643	649,721
44	631-2	562,676	670,778
45	631-3	511,703	694,814
46	632-1	577,772	760,865
47	632-3	607,793	750,886
48	633-1	604,844	757,928
49	633-2	634,880	772,967
50	637-1	292,16	550,253
51	637-2	493,196	670,295
52	640-1	598,256	763,508
53	641-1	610,400	868,679
54	646-1	832,517	1084,697
55	648-1	1099,460	1273,601
56	648-2	1021,490	1177,637
57	653-1	1126,613	1210,787
58	653-2	1069,643	1168,787
59	654-1	1135,565	1312,691
60	660-1	1183,604	1366,709
61	660-2	1186,664	1291,835
62	662-1	1240,646	1372,850

Data Source - Digitized at 1:24000 scale. Derived from Timber Stand Data Base. Current as of 1/89.

TIMBER STANDS-----(HHSTANDS)*

Data Source - Digitized at 1:24000 scale. Derived from Timber Stand Data Base. Current as of 1/89.

Note: All timber stands for the district are combined into one file. To pull out certain stands you need to overlay the compartment for that stand.

*Filename in MURIS System

TRAILS-----(HHTRL)*

Data Source - Digitized at 1:24000 scale. Derived from various sources. Current as of 1/89.

Note: The HHTR.RCT file contains trails by trail number. Processing needs to be done before the file can be used in an application. A file with .RCT extension contains the attribute data, and the first ten lines are text. The .RCT file is used to construct an image using program "RECTABLE". The above listing is a portion of the .RCT file. The user can access this file only by the command TRAILS.

*Filename in MURIS System

USGS QUADS-----(HHUSGS)*

ATTRIBUTE IDENTIFIER	ATTRIBUTE NAME
1	HUNGRY HORSE
2	WEST GLACIER
3	NYACK
4	STANTON LAKE
5	DORIS MTN
6	NYACK SW
7	MT GRANT
8	PINNACLE
9	ESSEX
10	BLACKTAIL
11	SUMMIT
12	HASH MTN
13	JEWEL BASIN
14	PIONEER RIDGE
15	FELIX PEAK
16	NIMROD
17	MT BRADLEY
18	RED PLUME MTN
19	CRESCENT CLIFF
20	CRATER LAKE
21	BIG HAWK MTN
22	QUINTONKON
23	CIRCUS PEAK
24	HORSESHOE PEAK
25	CAPITOL MTN

Data Source - Digitized at 1:24000 scale from N.A.D. 27. Current as of 1/89.

*Filename in MURIS System

LANDSAT VEGETATION-----(HHVEG)*

Data Source - Classification of 1981 LANDSAT 3 image, MSS data. Created 1985. Revised 1988.

Note: The following first two pages are a description of the attributes for the subsequent vegetative legend.

*Filename in MURIS System

LANDSAT LEGEND NORTH IMAGE
HUNGRY HORSE RANGER DISTRICT
JULY 3,1981 DATA
REVISED 1986

CODES AND ABBREVIATIONS

DN **Data Number** A numeric value assigned to each pixel representing different spectral classes.

Description General forest cover type.

SP1 **Species #1** Species #1-5 represent the most dominant feature or species of the class. Species are abbreviated by the first two letters of the generic name and the first two letters of the specific name.

ABLA	Abies lasiocarpa	Subalpine fir
ACGL	Acer glabrum	Mtn. maple
ALSI	Alnus sinuata	Mtn. alder
AMAL	Amelanchier alnifolia	Serviceberry
BEPA	Betula papyrifera	Paper birch
CARU	Calamagrostis rubescens	Pinegrass
LAOC	Larix occidentalis	Western larch
MEFE	Menziesia ferruginea	Menziesia
PAMY	Pachistima myrsinites	Pachistima
PIAL	Pinus albicaulis	Whitebark pine
PICO	Pinus contorta	Lodgepole pine
PIEN	Picea engelmannii	Englemann spruce
PIMO	Pinus monticola	White pine
POTR	Populus tremuloidies	Aspen
	Populus trichocarpa	Cottonwood
PSME	Pseudotsuga menziesii	Douglas fir
SALIX	Salix spp.	Willow
TABR	Taxus brevifolia	Pacific yew
VACA	Vaccinium caespitosum	Dwarf huckleberry
VAGL	Vaccinium globulare	Blue huckleberry
XETE	Xerophyllum tenax	Beargrass

ST **Structural Class**

0 Nonvegetated
<10% tree,shrub,or herbaceous canopy cover.

1 Tree seedling/herbaceous or herbaceous.
tree seedlings are < breast height(4.5') & .1-.9"dbh.
there is <10% canopy cover sapling and larger trees.
there is <10% canopy cover shrubs.

2 Tree seedling/shrub or shrub
> or = 10% canopy cover shrubs.
< 10% canopy cover saplings and larger trees.

3 Sapling
> or = 10% canopy cover sapling trees.
< or = 25% canopy cover pole and larger trees.

4 Pole/sapling trees
> 25% canopy cover pole size and larger trees.
< 10% canopy cover trees larger than pole size.

5 Young-mature trees
> or = 10% canopy cover trees larger than pole size
some trees showing decadence.

6 Old growth trees
> or = 10% canopy cover trees larger than pole size
past full maturity, showing decadence,.5 snags/acre.
> or = 2 canopy levels, overstory canopy closing to
10-40% or more, overstory + understory canopy > 70%.

FCC	**Forest Canopy Closure**	
1	0-10%	sparse
2	11-40%	low density
3	41-70%	medium density
4	71-100%	high density

HT	**Habitat Type Group** (appendix I Forest Plan)	
1	Group 1	warm and dry
2	Group 2	moderately warm and dry
3	Group 3	moderately cool and dry
4	Group 4	cool and moderately dry
5	Group 5	moderately cool and moist
6	Group 6	cool and moist
7	Group 7	wet
8	Group 8	cold and moderately dry

This legend will continually be updated with use. A number of classes where not checked due to the small size of the class or not in the sampled areas. Variation will be seen in classes with large gradients in elevation. Some correction may also be necessary within various geographical locations.

VEGETATIVE LEGEND NORTH LANDSAT SCENE

DN	DESCRIPTION	SP_1	SP_2	SP_3	SP_4	SP_5	ST	FCC	HT	REMARKS
1	NON-VEGETATED	WATER					0	0		SHADOWS ON STEEP SLOPES
2	CONIFER/WATER EDGE	MIXED					0	0		50/50 CONIFER-WATER
3	CONIFER/WATER EDGE	MIXED					0	0		
4	CONIFER/WATER EDGE	MIXED					0	0		RESERVOIR
7	AGRICULTURAL	SOIL					0	1		PLOWED SOIL
8	AGRICULTURAL	CROPS					1	1		NON-IRRIGATED CROPS
9	AGRICULTURAL	GRASS	SOIL				1	1		PASTURE, FALLOW
10	AGRICULTURAL	CROPS					1	1		IRRIGATED CROPS
12	CONIFER	PICO	PIAL	PSME			4	3		
13	CONIFER	PSME	LAOC	PICO			4	3		
14	CONIFER	PIEN	PICO				4	3		
15	CONIFER	PSME	LAOC	PICO	PIEN		4	3		
16	CONIFER	PSME	LAOC	PICL			4	3		
17	CONIFER	PSME	LAOC	PIEN			4	3		
18	CONIFER	PICO	PIAL				4	3		
19	CONIFER	PSME	PICO	LAOC			4	3		
20	CONIFER	PICO	PSME	LAOC			4	4		
21	CONIFER	PICO					4 (5)	3 (4)		
22	CONIFER	PICO	PSME				4	4		
23	CONIFER	PSME	PICO				4 (5)	4		
24	CONIFER	PIEN	LAOC	PSME						
25	CONIFER	PICO	PSME	PIEN			4	4		MAY CONTAIN SOME MATURE SAW TIMBER
26	CONIFER	PIEN	PSME	LAOC	PICO		5	3		
27	CONIFER	PICO	LAOC	ABLA	XETE		3	4	6	SMALL SAMPLE
28	CONIFER	PICO	PIAL				4	2		
29	CONIFER	PICO					4	3	6	SMALL CLASS
30	CONIFER	PIEN	ABLA				4	3	6	PI, VARIABLE & MIXED
31	CONIFER	PICO					4	3	6	SMALL CLASS
32	CONIFER	PIEN	PSME	PICO			4	3	4	DENSITY VARIES
33	CONIFER	PICO	ABLA				4	3	6	SMALL CLASS
34	CONIFER	PICO	PIAL	PIEN			4	3		
35	CONIFER	PICO	ABLA	PIEN			4	4	6	SMALL CLASS
36	CONIFER	ABLA	PIEN				4	4	6	SMALL CLASS
37	CONIFER	PICO	PIEN	ABLA	PIMO		4	4	6	SMALL CLASS
38	CONIFER	PIEN	PSME	LAOC			5(4)	3		
39	CONIFER	PSME	LAOC	PICO			4	4	6	SCATTERED MATURE
40	CONIFER	PICO	PSME	PIEN			4	4	6	NOT ON HHRD
41	CONIFER	PICO	PIEN				4	4	6	DENSITY VARIES W/ ASPECT
42	CONIFER	PIEN	LAOC	PSME			5	4	6	SMALL CLASS
43	CONIFER	PICO	PIEN	PSME			5	4	6	MAY CONTAIN PIMO
44	CONIFER	PICO					4	4	6	SMALL CLASS
45	CONIFER	PSME	PICO				4	4	4	SMALL CLASS

VEGETATIVE LEGEND NORTH LANDSAT SCENE

DN	DESCRIPTION	SP_1	SP_2	SP_3	SP_4	SP_5	ST	FCC	HT	REMARKS
46	CONIFER	PIEN	PSME	PICO			4	4	4	STRUCTURE VARIES
47	CONIFER	PIEN	PSME				4	4	4	SMALL CLASS
48	CONIFER	PSME					5	3		
49	CONIFER	PSME	LACO	PIEN			5	3		
50	CONIFER	PICO	PIEN	PIMO			5	3	6	SMALL CLASS
51	CONIFER	PIEN	ABLA	PICO	VAGL	XETE	5	3	6	EVEN MIX OF SPECIES
52	CONIFER	PICO	PIEN	LAOC			5	3	6	NO LAOC MIDFORK
53	CONIFER	PICO	LAOC	PIEN			5	3	6	
54	CONIFER	PIEN	ABLA	PSME			5	3	6	
55	CONIFER	PICO	PIEN	ABLA			5	3	6	
56	CONIFER	PSME	PIEN	LAOC			5	3	6	STRUC LRG POLE & SAW TIMBER
57	CONIFER	PSME	LAOC				5	3	6	
58	CONIFER	PSME	LAOC	PICO			5	3	4	
59	CONIFER	PICO	PSME	LAOC			5	3	6	SMALL CLASS, MIXED
60	CONIFER	PSME	PICO				5	3		
61	CONIFER	PICO	PIEN				5	3	6	
62	CONIFER	PIEN	PSME	PICO			5	3	4	SMALL CLASS
63	CONIFER	PSME	LAOC	PICO	PIEN		5	3		
64	CONIFER	PSME	PICO	PIEN			5	3		
65	CONIFER	PICO					5	4	6	SM CLASS FCC VARIES FROM 4-3
66	CONIFER	PIEN	PSME				5	4	6	SMALL CLASS
67	CONIFER	PICO	PIEN				5	4	6	
68	CONIFER	PIEN	ABLA	PSME	PICO		5	4	6	
69	CONIFER	PIEN	PSME	ABLA	PICO		5	4	6	
70	CONIFER	PICO	PIEN				5	4	6	SMALL CLASS,MIXED SIZE
74	MIXED CONIFER	PIEN	PSME	LAOC	PICO		5(4)	3		
75	MIXED CONIFER	PICO	PSME	PIEN			5	3	6	-
76	MIXED CONIFER	PICO	PSME	LAOC	PIEN		5	3	6	MIXED SPECIES
77	MIXED CONIFER	PIEN	PICO				5	3	4	MIXED SPECIES
79	MIXED CONIFER	PIEN	LAOC	PIMO	VAGL	XETE	5	2	6	MIXED UNDERSTORY
80	MIXED CONIFER	PIEN	ABLA	LAOC			4(5)	3	6	MIXED SPECIES
82	MIXED CONIFER/SHRUB	PICO	LAOC	ABLA	PIEN	SHRUB	5	2	6	MIXED CLASS, VARIABLITY
83	MIXED CONIFER/SHRUB	PIEN	ABLA	LAOC	PICO	ACGL	4	2	6	MIXED SPECIES & SIZE
85	MIXED CONIFER/SHRUB	PIEN	PICO	PSME	LAOC	MEFE	5	3	6	SPECIES & SIZE VARIES
87	MIXED CONIFER/SHRUB	PIEN	PSME	PICO	VAGL	TABR	5	3	6	SPEC VARIES, 2-ST CONTAIN OG
88	MIXED CONIFER/SHRUB	LAOC	PSME	PICO	PIEN	SHRUB	5	3	6	SIZE AND DENSITY VARIES
89	MIXED CONIFER/SHRUB	LAOC	PIEN	PSME	PICO	SHRUB	5	3	6	MIXED SPECIES AND SIZE
90	MIXED CONIFER/SHRUB	PSME	LAOC	PICO	SHRUB		5	3	6	MIXED SPECIES AND SIZE
91	MIXED CONIFER/SHRUB	PIEN	PICO	LAOC	ABLA	ALSI	5	3	6	MIXED SPECIES & SIZE
93	MIXED CONIFER/SHRUB	LAOC	PSME	PICO	PIEN	SHRUB	5	4	6	VARIABLE,SPECIES,SIZE
95	MIXED CONIFER/SHRUB	PSME	LAOC	ACGL	VAGL		6	3	4	MIXED SPECIES

VEGETATIVE LEGEND NORTH LANDSAT SCENE

DN	DESCRIPTION	SP_1	SP_2	SP_3	SP_4	SP_5	ST	FCC	HT	REMARKS
100	CONIFER/SHRUB	LAOC	PSME	XETE	AMAL	ACGL	4	2	6	MIXED SPECIES
101	CONIFER/SHRUB	LACO	PSME	PICO	SHRUB	XETE	4	2	6	MIXED SPECIES
103	CONIFER/SHRUB	PSME	PICO	SHRUB			4	2	4	SMALL CLASS
105	CONIFER/SHRUB	LAOC	PSME	PIEN	SHRUB		4	3	6	-
107	CONIFER/SHRUB	ABLA	PICO	SHRUB			4	3	6	DENSITY VARIES
108	CONIFER/SHRUB	LAOC	PICO	PSME	VAGL	ALSI	4	3	4	MIXED SHRUB
110	CONIFER/SHRUB	PICO	MEFE	XETE			4	4	6	MIXED SIZE
112	CONIFER/SHRUB	PIEN	LACO	PICO	SHRUB		5	2	6	NO LAOC MIDFORK
113	CONIFER/SHRUB	PSME	LAOC	PIEN	VAGL	XETE	5	2	6	-
114	CONIFER/SHRUB	PSME	PIEN	SHRUB			5	2	4	DENSITY LOW - MED
115	CONIFER/SHRUB	ABLA	SHRUB				5	2	6	SMALL CLASS
116	CONIFER/SHRUB	PSME	PICO	SHRUB			5	2	4	SMALL CLASS
118	CONIFER/SHRUB	PICO	PIEN	PSME	PIMO	SHRUB	5	3	6	SMALL CLASS
119	CONIFER/SHRUB	PICO	PIEN	SHRUB			5	3	6	SMALL CLASS
120	CONIFER/SHRUB	PSME	PICO	LAOC	SHRUB		5	3	4	LAOC DROP OUT IN MIDFORK
121	CONIFER/SHRUB	PSME	SHRUB				5	3	4	SMALL CLASS - MIXED
122	CONIFER/SHRUB	PICO	PIEN	SHRUB			5	3	4	DENSITY VARIES
123	CONIFER/SHRUB	ABLA	PIEN	SHRUB			5	3	6	MIXED SHRUBS
126	CONIFER/SHRUB	PICO	XETE	VACA	PIEN	ABLA	5	3	4	2-STORIED
128	CONIFER/SHRUB	PICO	PIEN	ABLA	ALSI	MEFE	5	4	6	MAY CONTAIN PSME
129	CONIFER/SHRUB	PICO	XETE	VAGL	PIEN	ABLA	5	4	6	2-STORIED
131	CONIFER/SHRUB	PSME	PICO	PIMO	SHRUB		5	3	4	-
132	CONIFER/SHRUB	PIEN	ABLA	MEFE			6	2	6	DENSITY VARIES
133	CONIFER/SHRUB	PIEN	ABLA	PICO	SHRUB		6	3	6	DOMINANT SPECIES VARIES
134	CONIFER/SHRUB	PIEN	PICO	ABLA	PSME	MEFE	6	3	6	-
135	CONIFER/SHRUB	LAOC	PIMO	PIEN	ABLA	VAGL	5	3	4	MIXED UNDERSTORY
137	CONIFER/SHRUB/GRASS	PSME	PIEN	ABLA	SHRUB	GRASS	5	3	4	MIX SPECIES, SIZE,DENSITY
138	CONIFER/SHRUB/GRASS	LAOC	PSME	PIEN	PICO	SHRUB	5	3	6	VARIABLE SPECIES & SIZE
140	GRASS/SHRUB	GRASS	SHRUB	ROCK	CONIF		2	1	4	SPARSE CONIFER
146	CONIFER/GRASS	PICO	LAOC	CARU			4	3	6	SMALL CLASS
147	CONIFER/GRASS	PSME	PICO	LAOC	GRASS		4	3	4	SMALL CLASS
148	CONIFER/GRASS	PICO	GRASS				4	3	4	SMALL CLASS
150	CONIFER/GRASS	LAOC	PICO	PSME	XETE		4	3	4	
151	CONIFER/GRASS	PSME	PICO	XETE			4	3	3	
152	CONIFER/GRASS	LAOC	PICO	PSME	XETE		4	3	3	
155	SHRUB	SHRUB	GRASS				2	1	6	SPARSE POLE CONIFER
156	SHRUB	MIXED					2	1	6	UNDIFFERENTIATED SHRUBS
158	SHRUB	ALSI	SALIX				2	1	6	SMALL CLASS
159	SHRUB	ALSI	SALIX	SHRUB	SOIL		2	1	6	MIXED SPECIES
161	SHRUB	ALSI	MEFE	SOIL			2	1	6	MIXED SHRUB -DRY ASPECT
162	SHRUB	ALSI	MEFE				2	1	6	-
163	SHRUB	SHRUB	ROCK	PIAL			2	1	8	SPECIES VARIES W/ ELEV

VEGETATIVE LEGEND NORTH LANDSAT SCENE

DN	DESCRIPTION	SP_1	SP_2	SP_3	SP_4	SP_5	ST	FCC	HT	REMARKS
167	SHRUB/CONIFER	ALSI	SHRUB	CONIF	GRASS	ROCK	2	1	6	-
168	SHRUB/CONIFER	POTR	CONIF				2	1	6	MIXED SPECIES
169	SHRUB/CONIFER	SHRUB	GRASS	CONIF			2	1	6	MIXED SPECIES
170	SHRUB/CONIFER	ALSI	CONIF				2	1	6	-
171	SHRUB/CONIFER	MIXED					2	1	6	DENSITY VARIES
176	SHRUB/CONIFER	ALSI	SALIX	ACGL	ABLA	PIEN	2	1	6	MIXED SPECIES
178	SHRUB/CONIFER	ALSI	MEFE	CONIF			2	2	6	SEEDLING/SAPLING MIXED
179	SHRUB/CONIFER	SALIX	ALSI	LAOC	ABLA	PIEN	2	2	6	MIXED CONIFER
180	SHRUB/CONIFER	ALSI	SALIX	ACGL	PIEN	ABLA	2	2	6	NONMERCH CONIFER
182	SHRUB/CONIFER	AMAL	SHRUB	PICO	PIEN	GRASS	3	2	6	MIXED SPECIES
183	SHRUB/CONIFER	MEFE	ALSI	LAOC	ABLA	VAGL	3	2	6	MIXED SPECIES
185	SHRUB/CONIFER	SHRUB	PICO	LAOC	VAGL		3	3	6	MIXED SPECIES
187	SHRUB/CONIFER	SHRUB	PSME	PICO	ABLA	GRASS	4	2	6	MIXED SPECIES & DENSITY
190	SHRUB/CONIFER	ACGL	ALSI	LAOC	PIEN	ABLA	5	2	6	LAOC OVERSTORY, MIXED
191	SHRUB/CONIFER	SHRUB	PIAL	ABLA	LUHI	XETE	5	2	8	MIXED SHRUB MEFE
192	SHRUB/CONIFER	ALSI	ACGL	POTR	ABLA	PIEN	5	2	6	MIXED SPECIES
198	HERBACEOUS	FORBS	MIXED							
200	HERBACEOUS	ROCK	GRASS				1	1	6	SMALL CLASS
201	HERBACEOUS	TALUS	GRASS				1	1	6	-
202	HERBACEOUS	SOIL	GRASS	CONIF			1	1	6	SPARSE CONIFER
203	HERBACEOUS	SOIL	GRASS				1	1		
207	HERBACEOUS	SOIL	GRASS	SHRUB			1	1	4	SMALL CLASS
208	HERBACEOUS	GRASS	SOIL				1	1	4	SHRUBS @ HIGHER ELEV
209	HERBACEOUS	SOIL	ROCK	GRASS	SHRUB		1	1	6	SPARSE CONIFER
210	HERBACEOUS	GRASS	ROCK	TALUS			1	1	6	DEBRIS ON GENTLE SLOPES
211	HERBACEOUS	GRASS	SHRUB	SOIL			1	1	6	-
215	HERBACEOUS	GRASS	SOIL				1	1	6	-
216	HERBACEOUS	GRASS	SHRUB	SOIL			1	1	6	SPARSE POLE CONIFER
217	HERBACEOUS	GRASS	SHRUB				1	1	6	SPARSE POLE CONIFER
219	HERBACEOUS	GRASS	SHRUB	CONIF			1	1	4	SCATTERED CONIFER
220	HERBACEOUS	GRASS	FORBS	SHRUB			1	1	4	SCATTERED CONIFER
221	HERBACEOUS	GRASS	SHRUB	CONIF			1	1	4	SPECIES VARIES W/ ELEV
222	HERBACEOUS	GRASS					1	1	6	SHRUBS INCREASE W/ ELEV
237	NON-VEGETATED	SOIL	ROCK				0	1	8	SMALL CLASS
238	NON-VEGETATED	TALUS					0	1	8	STEEP TALUS
239	NON-VEGETATED	ROCK					0	1	8	STEEP ROCK OUTCROPS
241	NON-VEGETATED	ROCK	WATER				0	1	6	HIGH ELEV VEG.
243	NON-VEGETATED	GRAV.	ROCK				0	1	6	-
246	NON-VEGETATED	SOIL	SAND	SILT			0	1	8	DENSE SHRUB ON >5800 NNE
247	NON-VEGETATED	ROCK					0	1	8	SMALL CLASS
249	NON-VEGETATED	TALUS	ROCK				0	1	8	' S OIL/ROCK
253	NON-VEGETATED	ROCK	SNOW	SHRUB			0	1	8	-
255	NON-VEGETATED	SNOW					0	1	8	ROCK, ALPINE SHRUB GRASS

ERDAS INFORMATION - FNF

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Programs asterisked on the following ERDAS Menu Driver require the user to be in the MURIS lab and must not be used from the district.

ERDAS
MENU DRIVER
REV. 7.2

* Requires Display

CORE (UTILITIES) MODULE

GENERAL
- HEADER/TRAILER MANAGEMENT
  - FIXHED
  - CLASNAM
  - BSTATS
  - LISTIT
  - IMPTRL
  - EXPTRL
- CREATE/ SUBSET DATA
  - MAKEFIL
  - * CPYSCR
  - SUBSET
  - CUTTER
  - MASK
- SPECIAL PURPOSE
  - * BLANK
  - CALC
  - EDPAT

COLOR MODIFICATION
- * PALETTE
- * RGBCLR
- * LSLICE
- * GETCLR

CURSOR ROUTINES
- * CURSES
- * CURBOX
- * DIGSCRN

ANNOTATION
- * LEGEND
- * SCRIPTO

DEMO
- * ZOOMER
- * SAVSCRN
- * DMPSCRN

DIAGNOSTICS
- * DIAG

LINE PRINTER
- CHMAP
- SCHMAP
- NPRINT
- NSPRINT

SYSTEM UTILITIES

IMAGE PROCESSING MODULE

DISPLAY
- * READ

ENHANCEMENT
- CONTRAST STRETCH
  - * HISTOEQ
  - DHISTEQ
  - * WFM
  - STRETCH
- FILTERING
  - * CONVV
  - DCONVV
  - TEXTURE
- IMAGE ARITHMETIC
  - * RATIO
  - DRATIO
  - * LNCOM
  - DLNCOM
  - MULT
  - PRINCE

CLASSIFICATION
- TRAINING FIELD SELECTION
  - * FIELD
  - * DIGFLD
  - * ELLIPSE
- TRAINING FIELD MANIPULATION
  - GETSIG
  - ADDSIG
  - SIGSUB
  - SIGNAM
  - SIGEDIT
  - APDSIG
  - SIGEXT
  - SIGDIST
- CLASSIFICATION
  - MAXCLAS
  - CLUSTR
  - STATCL
  - * ALARM
  - THRESH
  - * CLASOVR
  - CMATRIX

GEOMETRIC CORRECTION
- * GCP
- COORD2
- GCPERR
- RECTIFY
- DESKEW

RADIOMETRIC CORRECTION
- DESTRIP
- BADLIN

G.I.S. MODULE

DISPLAY
- * DISPLAY

UPDATING
- * PUPDATE

ANAYLSIS
- BASIC FUNCTIONS
  - OVERLAY
  - SEARCH
  - INDEX
  - MATRIX
  - RECODE
- SPECIAL FUNCTIONS
  - CLUMP
  - SIEVE
  - AGGIE
  - SUMMARY
  - SCAN
    - TOTAL
    - AVERAGE
    - MAXIMUM
    - MINIMUM
    - MEDIAN
    - MAJORITY
    - MINORITY
    - DIVERSITY
    - DENSITY
    - BOUNDARY

TAPES MODULE

INPUT
- LOADBIL
- LOADBSQ
- LOADX
- LOADBIP
- LDAVHRR
- READBIL
- DMPTAPE
- RDASCII

OUTPUT
- DUMPBIL
- DUMPBSQ
- SAVTAPE
- WRASCII

UTILITY
- MTCOUNT

SCALE HARD COPY MODULE

COLOR
- GISMAP
- LANMAP
- PRTLIS
- CLRCHRT

MONO
- SCALMAP

POLYGON DIGITIZING MODULE

DIGITIZE
- * DIGPOL
- * DIGBND

DISPLAY
- * DISPOL

GRID
- GRDPOL

MEASUREMENT
- MEASURE
- MSTEST

PROJECTION
- CCVRT

VIDEO DIGITIZING MODULE

DIGITIZE
- VIDDIG

TOPOGRAPHIC MODULE

INPUT
- LOADDEM

ANALYSIS
- ROTATE
- SLOPE (ASPECT)
- RESCALE
- RELIEF

SURFACE
- SORT
- SURFACE
- CONTOUR

TOOL KIT MODULE

TOOLS
- ERDLIB
- IDXLIB
- FLEX77
- F
- FM
- FT
- LK
- LKC

SOFTWARE SUBSCRIPTION SERVICE
- 1 YEAR APPLICATIONS SOFTWARE UPDATES
- TELEPHONE SUPPORT

USER-DEFINED MENU

Erdas™

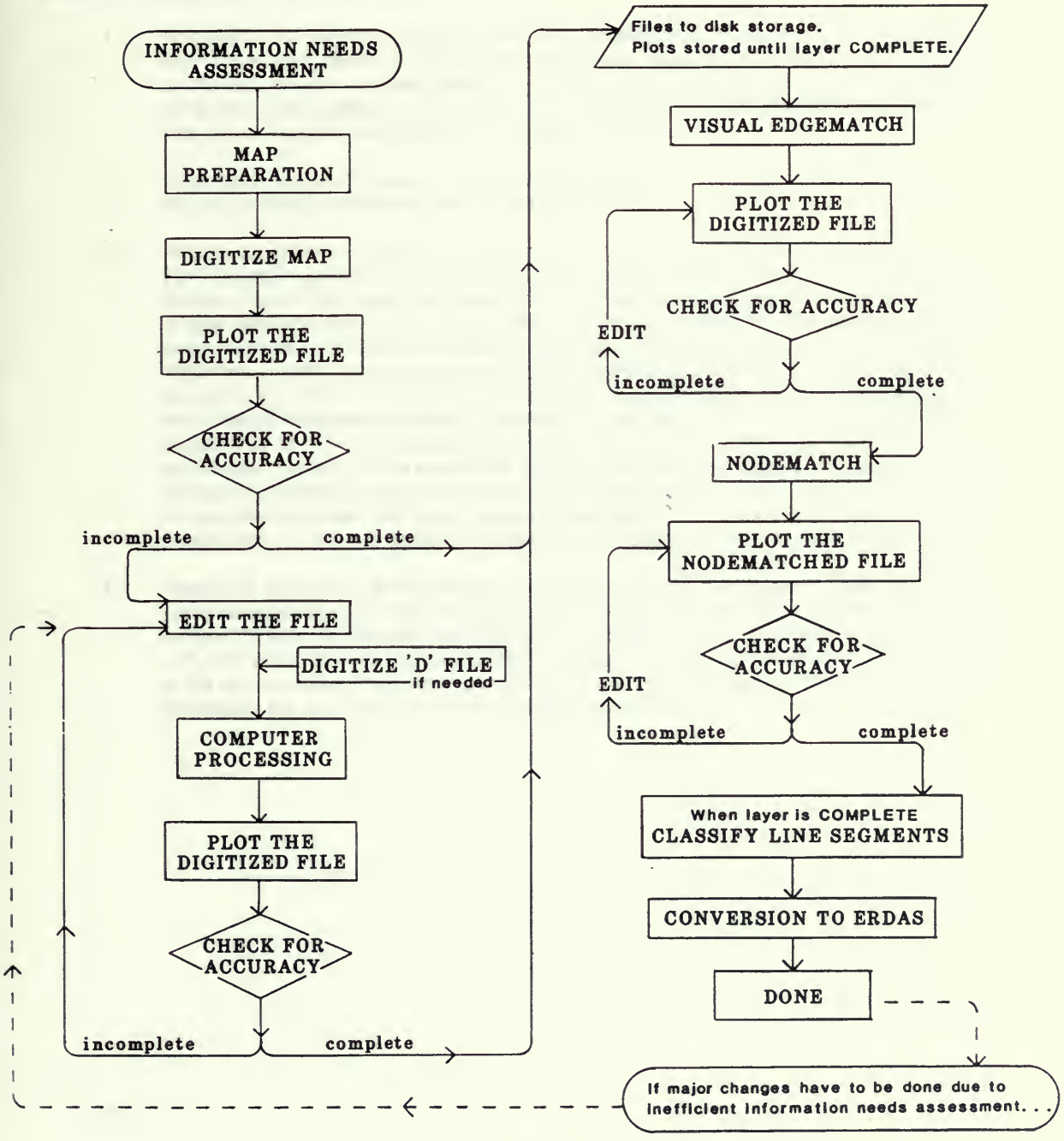
DATA CAPTURING & PROCESSING

This section deals with the following topics.

- Flow Chart
- Map Preparation
- Digitizing
- UTM Three Point Set-up
- What to Digitize
- Digitizer Area/Length
- Checking for Accuracy - Editing
- Computer Processing
- Nodematch Process
- Classification of Line Segments
- Project Vector Plots
- CalComp Plotter

FLOW CHART

The flow chart is provided to give the user an understanding of the sequence of steps for taking a base map layer through digitizing and conversion into the ERDAS system.



MAP PREPARATION

When a base layer is to be digitized and placed into the MURIS database, the maps should be checked prior to any digitizing. This check includes:

1. Map quality. All lines to be digitized are clearly marked. If lines are drawn on the base map, they should be in pencil or colored pencil and easily distinguishable from the other "garbage" on the map. Messy, smudged, folded, or grossly out of scale base maps can not be tolerated. If the lines to be digitized are drawn on the base maps, the width should be no more than 0.05 inches (roughly twice the width of the pencil point).

2. Edgematch. Adjacent maps should be edgematched. Lines which connect from one map to the next should meet exactly at the edge of the maps.

3. Registration points. Hopefully, the maps are by quad, in which case the quad corners are the registration points and header files already exist. If the maps are not by quads, the user needs to select the registration points from known latitude longitude points. Each map needs at least four registration points which cover the width and length of the base map. Adjoining maps must have at least two common registration points for edgematching. Once the registration points are determined, the latitude longitude of each point should be obtained as well as the UTM coordinates for that latitude longitude. There is a printout which covers the Flathead National Forest and contains the conversion for latitude longitude to UTM coordinates for zone 12 which is the zone our system currently utilizes. After the UTM coordinates are obtained, a header file needs to be created for each map. It is recommended to copy an existing header file and then, in SED, change the UTM values to the UTM coordinates for the new map. Keep the same columns, placement of commas and periods. The user should also change the banner line (first line in a header file) to read for the map filename.

4. Filenames. Some sort of file naming convention should be determined for new layers. For instance, bear management units which are by quad are called BMU# where # is the quad number. Stream maps are separated by district and digitized by quad. Their naming convention is TLST# where the first two letters refer to district, ST refers to stream maps, and # refers to the quad number. The filename is the name which goes at the far right of the first line in the header file, and will appear at the bottom of the plots.

DIGITIZING

This document is for digitizing in tablet inches. If the map is to be digitized in UTM coordinates, refer to UTM THREE POINT SET-UP document.

BEFORE OPENING FILE:

1. Tape map down. If map is a whole 4" to the mile quad map, place map with top of map facing towards the right side of digitizer. This is done so that the entire map can fit on the digitizer. Review map for registration coordinates and what needs to be digitized.

2. Turn digitizer on. Press reset button, display should show all '8's. All '8's on the display mean the system is working properly.

3. Place cursor on board and press any number, should see red light on cursor.

4. Place cross-hairs of cursor on "bulls-eye" of menu board (lower left corner of the digitizer). While cross-hairs are lined up, press "MENU ORIGIN", then "0". This orients the menu to the digitizer so that the menu board can be used.

5. If the map is a whole 4" (1:15840) quad map, complete this step. If not skip to step 6.

    a. Place map on digitizer with top of map at right side of digitizer.
    b. Place cross-hairs of cursor over "X ROTATION" area on menu board, press "READ MENU". Display should show '1'.
    c. Place cursor over top left corner (as map sits), press "enter". Display should show '2'.
    d. Place cursor over bottom left corner, press "enter".
    e. Place cursor cross-hairs over "X OFFSET" area of menu board, press "READ MENU". Display should show '0'.
    f. While still in the "X OFFSET" area, press '25', then "enter". Origin is now in the top left corner of board. Digitize map/maps.

NOTE: Board will remain set with the origin the the top left corner until reset or turned off.

6. If this is a new file that has never been digitized, skip this step. If this is an edit, or 'D' file, perform a three point set-up. A 'D' file is the identification for a file to be appended to an existing file, i.e. SBST67D is a 'D' file to be appended to SBST67.

    a. Place cross-hairs of cursor within the "3 point set-up" area of menu board, press "READ MENU". Display should read 3PSU 1.
    b. Place cross-hairs of cursor on registration point on map (furthest left, lowest easting), press "enter", press "X map coordinate" (easting), press "enter", press "Y map coordinate (northing), press "enter".
    c. Place cursor on next registration point on map, press "enter", "X map coordinate" (easting), "enter", "Y map coordinate" (northing), "enter".
    d. Place cursor on next registration point on map (furthest right, highest easting), press "enter", "X map coordinate" (easting), "enter", "Y map coordinate (northing), "enter".

e. Check all 4 registration points as well as any internal coordinates given. The value shown on the display should be within 0.02 inches of actual value. If not, repeat this step. If still not within 0.02 inches, shift plot to new location on digitizer and retape down. Redo this step. If still off, double check coordinates used. If still off, get help.

TO CREATE A DIGITIZED FILE:

1. Go to computer terminal associated with digitizers, set up the black boxes as given below.

for 'MUTT', CON 35	for 'JEFF', CON 36
Top black box to '35'	Top black box - ignore
Mid black box to '35'	Mid black box to '36'
Bot black box - ignore	Bot black box to '36'

2. Logon computer terminal. (NL means new line key).
USERNAME: DIG NL
PASSWORD: SEE MURIS STAFF FOR PASSWORD
Screen will display:

RESIDENT

AOS/VS CLI Rev. 07.56.00.00 'date' 'time'
RAW:

3. **RAW:** is the prompt. If this does not appear, get help!
To create the file, type: **RAW:** CR/I filename NL

(where CR/I is the command to create files, where filename is SLST99 or TLOW8 or whatever file is being digitized. Edit files should have a 'D' extension, i.e. SLST99D TLOW8D.)

When the file is created, the screen will display **RAW:**). If you don't have the ')' displayed, your file is not open/created. Try again.

4. Switch black box as indicated below.

for 'MUTT'	for 'JEFF'
Top black box to 'Digitizer'	Bot black box to 'Digitizer'

5. Digitize the map.
   a. If this is a new map, registraton points are done first.

Press code '5' in upper left		Press code '5' for
Press code '5' in lower left corner		each registration pt
Press code '5' in lower right corner	**OR**	in order marked.
Press code '5' in upper right corner		
Press code '2' anywhere on map		Press code '2'
Digitize map		Digitize map
Use code '1' for digitizing each ARC/NODE		
Use code '2' for ID at end of ARC at node location		
Press code '9' at end of file.		Press '9' at end

   b. If the file is a 'D' file (edit map), digitize the lines needed and end with a code '9'. Do not digitize registration points.

6. To close file at terminal, first switch black box

for 'MUTT'	for 'JEFF'
Top black box to '35'	Top black box - ignore
Mid black box to '35'	Mid black box to '36'
Bot black box - ignore	Bot black box to '36'

   At screen, hold shift key down and press ")" NL
   RAW: should appear. File is not closed until **RAW:** appears. If it doesn't, try again.

7. At this point, the next map can be digitized or you can log off.
   a. If it is a 'D' file, repeat step 6 of BEFORE OPENING A FILE section followed by steps 3-6 of TO CREATE A DIGITIZED FILE section.
   b. If it is a new file, repeat steps 3-6 of TO CREATE A DIGITIZED FILE section.
   c. To log off, type "out" at the **RAW:** prompt.
      RAW: OUT NL

COMMANDS

If no file is open, these commands can be used from the **"RAW:"** prompt:

OUT	logs you off the system and resets ACLs.
FS	allows you to look at all the files in RAW.
TY	shows what is in a file, no editing.
DEL/V filename	will delete a file and verify.
ACCR	will reset ACL's for any file.

NOTE: NO EDITING CAN BE DONE IN THE DIG PROFILE!!

DIGITIZING PROCESS

CODES	EXPLANATION
5 = registration	Tells computer programs that this coordinate is a registration point. Used at beginning of newly digitized files.
1 = points	Tells computer that these coordinates are parts of lines or individual points.
2 = breaks	Tells computer that this is the end of a segment or point.
3 = errors	If you make an error, pressing code '3' will tell the computer to ignore all code '1's up to the last code '2', or if pressed just after a code '2' back up to the second code '2'.
6 = polygons	Used if digitizing polygons. Allows for a larger circle of closure on the polygon only.
9 = end of file	Pressed only at end of digitizing. If pressed earlier, all codes pressed after it will be ignored by the computer programs.

UTM THREE POINT SET-UP

1. Tape map down within the etched corners on the digitizer. If map is a 4"scale map, place map with top of map facing towards the right side of digitizer.

2. Turn digitizer on. Press reset button, display should show all '8's. All'8's on the display mean the system is working properly.

3. Place cursor on board and press nay number, should see red light on cursor.

4. Place cross-hairs of the cursor on the "bullseye" of menu board (lower left corner of the digitizer). While cross-hairs are lined up, press "MENUORIGIN", then "0". This orients the menu to the digitizer so that the menu board can be used.

5. Place the cursor on 'SIGNIF. DIGITS' of the menu board, press "READ MENU", "0", then "enter/output".

6. Place the cursor on 'OUTPUT FORMAT' of the menu board, press "READ MENU", then "70".

7. Hold the cursor *OFF* the menu board, press "READ MENU".

8. Place the cursor on 'THREE POINT SET-UP' of the menu board, press "READ MENU". Display should show "3 PSU 1". If not, press "READ MENU" again.

DO NOT MOVE CURSOR WHILE ENTERING COORDINATES!!

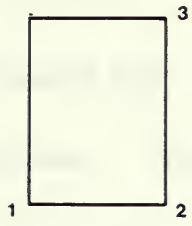
9. Place the cursor on the quad corner of the furthest left AND lowest easting coordinate [corner (1) on the diagram below]. Press "enter", "easting map coordinate", "enter", "northing map coordinate", "enter".

10. Place the cursor on the second quad corner [corner (2) on the diagram below]. Press "enter", "easting map coordinate", "enter", "northing map coordinate", "enter".

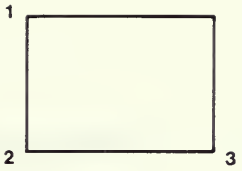
11. Place the cursor on the quad corner of the furthest right AND highest easting [corner (3) on the diagram below]. Press "enter", "easting map coordinate", "enter", "northing map coordinate", "enter".

12. Check all quad corners. The UTM coordinates displayed should be within 16 meters of the actual UTM coordinates for that corner. If not, repeat steps 8 through 12. If still not within 16 meters, shift quad slightly on the digitizer and retape down. Redo steps 8 through 12. If still off, double check UTM coordinates. If still off, get help.

2.64" (1:24000)



4" (1:15840)



At this point, the user can either read the UTM coordinates they need off the quad or create a computer file to digitize the UTM coordinates into. If the latter, refer to the DIGITIZING document and start at the TO CREATE A DIGITIZED FILE: section.

WHAT TO DIGITIZE

GEOLOGICAL AREA MAPS (GEO*, eg. GEO12)

Registration Points: The four, six, or nine quad corners.

Scale: 1:63360 (1")

Digitize: All pencil lines marked, solid and dashed. Some dashed lines may appear to start or end randomly. They are fault lines. Ignore the purple lines, do not digitize them.

Breaks: Put breaks any time lines cross.

LANDTYPE MAPS (__LT*, eg. TLLT4)

Registration Points: There are anywhere from 4 to 15 points, digitize them in numerical order. Should be counter clockwise.

Scale: 1:63360 (1")

Digitize: All lines defining landtypes except for boundary lines (they have been done on OWnership maps).

On boundaries: Digitize one tenth inch (.10") over boundary line in direction the line is going. Usually digitize one point on the boundary and one point one tenth over the boundary.

On edges of maps: Where a line crosses over from one map to another, the last point digitized for the line segment should be on the edge. Do not go over.

On short segments: If distance is over 0.03", digitize the segment carefully. If distance is under 0.03", do not digitize the segment and create one common endpoint for the remaining joining segments.

Breaks: Put breaks anywhere the lines intersect.

OWNERSHIP MAPS (__OW*, eg. GVOW5)

Registration Points: The four corners on the quad.

Scale: 1:24000 (2.64")

Digitize: All ownership lines defining/delineating the following:
- Private land - white
- National Forest land - green shading
- State land - blue shading
- National Park land - lt purple shading
- Indian Reservations (BIA) - white
- Champion Internat'l. land - orange shading
- Burlington Northern land - pink shading
- Anaconda Aluminum or CFAC land - purple shading

All national forest boundaries -
All district boundaries - except for Hungry Horse R.D.
All county boundaries -

Breaks: Put breaks anywhere that lines intersect.

NOTE: Refer to 1/2" scale map of forest (marked 'OWNERSHIP' on Jim's desk) for updated changes on ownership as there are many changes. Some questions will need to be answered by the Lands section upstairs.

PRECIPITATION MAPS (__PC*, eg. SLPC7)

Registration Points: Usually the four corners defining the area of the quad.

Scale: 1:63360 (1")

Digitize: All precipitation lines, regardless of ownership or boundaries. Be careful not to digitize or correct to elevational contour lines, roads, or streams.

Breaks: No lines should cross on these maps, so no breaks anywhere.

NOTE: Digitize up to edge of map. Last point digitized for a line segment should be right on the edge. The line drawn across the middle, which demarks the north half from the south half, should be treated as a map edge. Thus, end on this line.

ROAD & TRAIL MAPS (__RD*, eg. HHRD38)

If a district or area was mostly roads, the transportation network file was called filenameRD. If mostly trails, then it was called filenameTR.

Registration Points: The four corners of the quad.

Scale: 1:24000 (2.64")

Within the National Forest

Digitize:
- All roads - includes deleted roads on maintenance maps.
- All trails - includes deleted trails on maintenance maps.
- All airports and landing strips.

Breaks:
- All intersections.
- Changes between road/trail classifications or number, eg. paved to unpaved roads, road to trail, RD1624 to RD1633, etc., etc.
- Bridges.
- Gates.

Outside the National Forest

Digitize:
- Any main or secondary road - not including driveways, or ranch access.
- All roads/trails accessing national forest land.
- All airports and landing strips.

Breaks:
- All intersections.
- Changes between road/trail classifications or number, eg. paved to unpaved roads, road to trail, RD1624 to RD1633, etc., etc.
- Bridges.
- Gates.

NOTE: If plot is labeled filenameTR, put wilderness boundaries on plot. If plot is labeled filenameRD, do *not* put wilderness boundaries in.

SECTION, TOWNSHIP and RANGE (STR*, eg. STR68)

Registration Points: The four corners of the quad.

Scale: 1:24000 (2.64")

Digitize: All section lines. Define straight lines with two points. Lines at the edge of the quad should be only two points. Watch for section lines which bend, have an angle.

For lakes: For small lakes and rivers, extend the section lines across. For larger lakes, extend the section lines that include land to form corners, otherwise extend the line into the lake about 0.1".

Breaks: Put breaks at all junctions.

STAND or TIMBER STAND MAPS (Not stan maps) (__SM*, eg. SLSM23A)

Registration Points: If on quads, use the four quad corners. If not on quads, digitize all registration points in numerical order (anywhere from 4 to 10+).

Scale: 1:24000 (2.64")

Digitize: All lines defining timber stands except when they correspond to boundary or ownerships lines.

On ownerships & boundaries: Digitize over boundary line by one tenth (0.10"). Usually digitize the second to the last point of segment on the boundary and the last point one tenth over boundary in the same direction. On these lines, do not cross the lines once over the boundary.

On edges of maps: Digitize last point of that line segment exactly on the edge of the map.

On short segments: If the distance is over 0.03", digitize segment as is, carefully hitting the endpoints of the lines involved. If the distance is under 0.03", do not digitize the segment. Create one common endpoint for the connecting lines.

Breaks: Put breaks at all intersections.

STREAM MAPS (__ST*, eg. SBST93)

Registration Points: The four corners of the quad.

Scale: 1:24000 (2.64")

Digitize:
All streams - Intermittent and perennial.
All rivers - Both sides of the river are digitized ONLY IF river is greater than 0.05 inches wide. See Stan, Kathy or Jim.
All creeks.
All lakes, reservoirs.
All intermittent lakes.
All glaciers.
All bogs or marshes - Digitize as close as possible to the symbols.
All falls - Mark by putting a break in stream or river where the falls occur.
All springs - Mark by putting a break in stream where springs occur. If not associated with a stream, digitize symbol where the spring is located.
All snowfields - as marked on maps.

Breaks:
Any intersection: stream to stream, stream to lake, etc., etc.
When stream changes from intermittent to perennial.
When stream breaks off while going through marshes; conversely no break is needed when stream goes continuously through marsh.
All fishery reach limits, as marked.
All electrostatic fishing sites.
All coring sites for fishery information.
All spawning area boundaries.
All barriers marked for fishery information.

SUB-DRAINAGE MAPS (SUB*, eg. SUB59)

Registration Points: The four corners of the quad.

Scale: 1:24000 (2.64")

Digitize: All sub-drainage lines marked.

Breaks: At all line intersections.
At all WQM stations where the line crosses the stream.
At all locations where sub-drainage line crosses a stream.
Anywhere sub-drainage lines meet at stream junctions.

NOTE: For classification, indicate those lines that are district boundaries, forest boundaries, or streams. These lines will be taken from another layer.

DIGITIZER AREA/LENGTH

DIGITIZER START UP

1. Turn power 'ON', switch located on back of the display unit.

2. Press RESET button, located on back of display unit.

3. Place curser on board, press any key. Should have red light on cursor.

4. Register menu by placing cross-hairs of cursor on "bulls-eye" of menu board (lower left corner), press "MENU ORIGIN", then "0". Digitizer display should read close to 0.000 0.000.

FOR AREA or LENGTH

1. If areas are to be measured, place curser over 'area' on menu board, press "READ MENU".

2. If lengths are to be measured, place curser over 'length' on menu board, press "READ MENU".

3. For correct scale, place curser over 'area-length', press "READ MENU", correct scale adjustment value (see chart below), then "enter/output".

4. To change significant figures (decimals), place curser over 'signif. digits', press "READ MENU", number of decimal places wanted (0 1 2 etc), then "enter/output".

5. To measure AREAS, position curser cross-hairs at starting point, press "S/S/." key. Display should read "A 0 0 0 0". Trace area desired, in a clockwise direction, and come back to starting point. Press "S/S/." key. Display will read area measured. Repeat this step for remaining areas. NOTE: Once the 'S/S/.' key is pressed to start next area, the value for the previous area is cleared.

6. To measure LENGTHS, position curser cross-hairs at starting point, press "S/S/." key. Display will automatically and continuously read off distances. Trace line desired. At end of line, press "S/S/." key. Display will give final distance measured. Repeat this step for remaining lengths. NOTE: Once the 'S/S/.' key is pressed for next length, the value for the previous distance is cleared. Also, this machine is extremely sensitive. *Very minor* hand trembles will register a distance!!

NOTE: It is a good idea to check the scale by: 1) tracing a section and seeing how close value is to 640 acres for areas, or 2) tracing a side of a section and seeing how close value is to 5280 feet for lengths. It is also recommended to trace everything twice and take the average.

To add or subtract areas/lengths: After first area/length is digitized, place cursor on "+" (add) or "-" (subtract) area of menu board and press "READ MENU". Digitize second area/length. Place cursor over the "+" or "-" area of menu board and press "READ MENU". Display will read the sum or remaining area/length.

SCALE ADJUSTMENT FACTORS (Multiplier for area/length)

MAP SCALE inches/mile	MAP SCALE ratio	SCALE ADJUSTMENT FACTOR LENGTH (ft)	SCALE ADJUSTMENT FACTOR AREA (acres)
1/4"	1:253440	21120	10240
1/2"	1:126720	10560	2560
1"	1:63360	5280	640
2"	1:31680	2640	160
2.64"	1:24000	2000	91.83
4"	1:15840	1320	40
8"	1:7920	660	10
1"=200'	1:2400	200	.91827
1"=100'	1:1200	100	.221
1"= 50'	1:600	50	.0574

To calculate other scale factors using inch/mile:

AREAS:

$$\frac{640 \text{ acres}}{(\text{inches/mile on map}) \times (\text{inches/mile on map})} = \text{scale adjustment factor}$$

LENGTHS:

(5280 ft) / (inches/mile on map) = scale adjustment factor

To calculate other scale factors using ratio value:

AREAS:

$$\frac{[(\text{map scale})/12] \times [(\text{map scale})/12]}{43560 \text{ ac/sq in}} = \text{scale adjustment factor}$$

for example: on a 1:12000 scale map

$$\frac{[(12000)/12] \times [(12000)/12]}{43560} = 22.957 \text{ scale factor}$$

LENGTHS:

[(map scale) / 12] = scale adjustment factor

CHECKING FOR ACCURACY - EDITING

Once a map has been initially digitized, a plot of the file should be created in order to check the digitized file for accuracy. This check involves comparing the plot of the digitized data file against the original base map. The WHAT IS DIGITIZED section gives a listing of the type of information which should be digitized and the placement of segment breaks for the various data layers. Digitized lines should follow the original map line. Discrepancies, errors of omission or addition should be corrected by making the necessary changes in the computer printout of the digitized data file. After marking the printout, the changes are made in the computer data file and a new plot made. Refer to the Computer Processing section for how to makes these changes and how to create a new plot.

To order printouts of files, use the following steps.

1. Log on the computer and navigate to the folder where the file is stored.

   USERNAME: GUEST.MURIS1 (or GUEST.MURIS2, GUEST.MURIS3)
   PASSWORD: (See MURIS staff for password.)

   HOME OFFICE: R01F10A
   HOME USERNAME: M.MOUSE (first initial.last name)

   Go to the IS environment, then the appropriate folder.
   CTRL key + SHIFT key + F4 key

   1 (1. Access Information)
   3 (3. Other Staff)
   STAFF NAME: MURIS (Staff Name)
   DRAWER: GIS (Drawer Name)
   FOLDER: SL (Folder Name, Index (SHIFT + F2) key for possible choices.)

2. Run the GIS.PRINT program. This program will either create a printout of the digitized file, or create a file just like the printout on the computer. It is recommended that the user get a hardcopy of the printout. Creating a computer file of the printout is useful when one or two minor changes need to be made in a digitized file. Remember that you get the line, page, coordinates of the line which needs to be altered from the computer file of the printout (labeled filename.FP), but the actual changes are made in the digitized file.

COMMAND: GIS.PRINT (Executes the program.)
FILENAME: SLST63 (Name of the file for which you need the printout.)

PRINTER NAME OR FILE F: @LPT1 (The default high-speed printer is highly recommended.)

CHECK PRINTER FOR OUTPUT
FILENAME: (User either lists the next file or exits the program with the new line key.)

- OR -

COMMAND: GIS.PRINT
FILENAME: SLST63
PRINTER NAME OR FILE F: F (Type 'F' then 'new line' key to create a computer file of the printout.)

OUTPUT TO FILE SLST63.FP
FILENAME: (User either lists the next file or exits the program with the new line key.)

3. Log off the computer from the COMMAND prompt.
CTRL key + SHIFT key + F1 key (Goes back to CEO main menu.)
CTRL key + SHIFT key + F1 key (Logs user off computer from the CEO main menu.)

When the digitized files are complete and accurate, the corresponding plot should be labeled "COMPLETE", dated, initialed, and stored.

COMPUTER PROCESSING

The following procedures are completed on the Data General. The file SLST63 is used as an example. The user should type the filename which they are working on instead of SLST63 as done in the steps below. All possible steps are given. While processing, the user should determine if the particular step is pertinent to their file. For example, not all files will have a 'D' file to be appended to the main file. If there is a 'D' file the steps pertaining the 'D' files should be completed. The correct storage folder can be determined from the file listing folder, or by using the FIND.FILES program. This program searches on both D4 and D5 disks, and will list all occurrences of the filename given. Templates are usable.

COMMAND: FIND.FILES
ENTER FILENAME TO SEARCH FOR:
(Type in the filename.)

1. Log on the computer and navigate to the desired folder.

USERNAME: GUEST.MURIS1 (or GUEST.MURIS2, GUEST.MURIS3)
PASSWORD: (See MURIS staff for password.)

HOME OFFICE: R01F10A
HOME USERNAME: M.MOUSE (first initial.last name)

Go to the IS environment, then the appropriate folder.
CTRL key + SHIFT key + F4 key

1 (1. Access Information)
3 (3. Other Staff)
STAFF NAME: MURIS (Staff Name)
DRAWER: GIS (Drawer Name)
FOLDER: SL (Folder Name, Index (SHIFT + F2) key for possible choices.)

2. Move the needed file(s) from the storage folder to the WORKING folder, using the X MOVE or MOW program. The MOW program will only move files to the WORKING folder. It does not have a delete files option. When the disk is near capacity, files are not moved completely. To check for this problem, note the size of the file before moving, then check the size of the file moved to WORKING.

COMMAND: FS SLST63 (Note the size of the file.)
COMMAND: MOW
ENTER FILENAMES TO BE MOVED TO WORKING: SLST63
(List the filename(s) to be moved.)

- OR -

COMMAND: FS SLST63 (Note the size of the file.)
COMMAND: X MOVE
FILES TO BE MOVED: SLST63 (Several files can be moved at the same time, just list with a space or comma between file names.)
DRAWER NUMBER: 3 (for GIS drawer)
FOLDER NUMBER: 16 (for WORKING folder)

newline key (DO NOT delete the file, just press the new line key)

3. Go the the WORKING folder. Check to see if the file was completely moved by comparing the size of the file in WORKING to the size of the original file in the storage folder.

SHIFT key + F11 key (This will go back to the folder line in the IS menu.)
FOLDER: WORKING (Type the folder name you want.)

COMMAND: FS SLST63 (Check the size of the file. Is the whole file there?)

4. If this is a newly digitized file, or there is a 'D' file which needs to be added to the file, the user needs to go to the RAW folder and move that file from RAW to the WORKING folder. Use the X MOVE or MOW program.

SHIFT key + F11 key (This will go back to the folder line in the IS menu.)
FOLDER: RAW (Type the folder name you want.)

COMMAND: MOW
ENTER FILENAMES TO BE MOVED TO WORKING: SLST63D
(List filename(s) to be moved.)

- OR -

COMMAND: X MOVE
FILES TO BE MOVED: SLST63D (List the file(s) to be moved.)

DRAWER NUMBER: 3 (for GIS drawer)
FOLDER NUMBER: 16 (for WORKING folder)

newline key (Do NOT delete the file, just press the new line key.)

5. Go to the WORKING folder.

SHIFT key + F11 key	(This will go back to the folder line in the IS menus.)
FOLDER: WORKING	(Type the folder name you want.)

6. If there is a newly digitized file, or a 'D' file, the FIX program needs to be run on that file. This program eliminates the blank lines between the coordinates.

COMMAND: FIX SLST63D	(Output file of the program has the same name.)

7. If the file is to be edited, use the SED text editor and SED text editor commands to make the necessary changes as marked on the computer printout of that file. Remember to start at the end of the file, adding the 'D' file first, and work towards the beginning of the file.

COMMAND: SED SLST63

SHIFT + F5	(for Position Page Last)
CTRL + F2	(for Last Line on Page) (Check for a 2, and a 9, code line at the end of the file. If these two lines are not there, add them.)
APP FROM SLST63D	(Adds the 'D' file to the end of the main file, and moves the cursor to the end of the added 'D' file. Check for 2, and 9, code lines at end of appended file. Add if needed.)
F4 key	(for Go to Previous Position)
DEL line number	(At the **previous** end of file, there is still a 9, code line. Delete this line.)

Continue with the remaining edits of the file, working from the end of the file to the beginning. The following are a few SED commands which may prove useful. See SED editor users manual for additional commands.

MOD line#	Places cursor on line# for changing the coordinates of this line.
DEL line#	Deletes line#.
DEL line# line#	Deletes from line#1 to line#2 inclusively.
PO PA page#	Will position on page#, first line is highlighted.
PO line#	Will position on line#, line# is highlighted.
SHIFT key + F11 key	Provided there are not more than 1023 lines on the page, this will insert a blank line above the line highlighted. If there are 1023 lines, the page will have to be split first. The cursor must be at the beginning of a line to do this; otherwise, you will split the line.

8. Run the GIS.CLOSE program. This program will join the intersections together with exact common coordinates, within the given allowable closure circle. It will also clean-up error codes (the 3 button on the digitizer cursor), check for added/missing keystrokes, and syntax errors.

COMMAND: GIS.CLOSE	(If the file is >250,000 bytes, use the GIS.CLOSE2 program. It has the exact same prompts, but has the capability for larger files.)
INPUT FILE: SLST63	
OUTPUT FILE: SLST63OUT	(Always use OUT extensions for the output files.)
CLOSURE GAP: .02	(Always 0.02 inches.)

Computer states: PROGRAM RUNNING . . . .PROGRAM COMPLETE or INVALID DATA AT LINE ####. If the former message, great! If the latter, you need to SED the input file, find the error, and correct it. Remember that in SED the line number is based upon 1023 lines per page, but the line number given for invalid data is a running line count value. Once the error is corrected, delete the OUT version created when the program bombed, and rerun GIS.CLOSE.

9. Change the header file. The header file contains the UTM coordinate values for that particular quad or file. This enables the PREP program to adjust the scale accurately and register the file to the correct UTM coordinates. Only the first line of the header file is to be changed. This first line is the text printed at the bottom of the CalComp plots. The following is a list of the header files currently in use.

"quad #"	for those files digitized by quad		
GSM___	for GVSM	GL__	for GVLT
SSM___	for SLSM	HL__	for HHLT
TSM___	for TLSM	BL__	for SBLT
GP_	for GVPC	SL__	for SLLT
BP_	for SBPC	TL__	for TLLT
SP_	for SLPC	WL__	for WILT
TP_	for TLPC	GBL__	for GBLT
CP_	for LCPC	ML__	for MMLT
LP_	for LOPC	LL_	for LCLT
GE___	for GEO		
CW__	for CWRD		

COMMAND: SED 63	(File 63 is the header file for quad 63.)
F6	(for Modify Current. Change the file name to the current file name. The last two letters of the file name can only exceed the "10" on line 4 by two spaces to the right. Anything beyond the two spaces will not printed.)
newline key	(Be sure to press new line so the change is incorporated.)
break esc key	(To return to the prompt line.)
BY N	(To exit from the file.)

10. Run the PREP program. Using the header file, this program converts the tablet inch file into a binary file of the UTM coordinates. On line data, it will check for lines defined by one point (single points) or lines with two points both of which are the same (skipped segments). If a single point or segment skipped error occurs, a message will scroll through on the screen, use the HOLD key to catch it. The message will give the line, page, and coordinates for the error. The program also checks the fit between the tablet inch registration points and the known UTM coordinates for the registration points. The resulting RMS error should be less than 1/1000 of the map scale, or 24 for 1:2400, 63 for 1:63360, etc.

COMMAND: X PREP	
1	(for Numonics)
MASTER INPUT FILE: 63	(Give the header file name.)
RAW DATA FILE: SLST63OUT	(Input file is the output file of GIS.CLOSE.)
OUTPUT FILE: SLST63PREP	(Always use a PREP extension.)
DISCRETE POINTS: 0	(A zero means NO and it is line data, a '1' means YES and it is single point data.)
CHANGE BANNER: 0	(A zero means NO. The banner was corrected when the header file was changed. If the banner shown is incorrect, type '1' and retype the correct banner.)

As the program scrolls by, check for the RMS error. Is it acceptable? Also watch for single or skipped point errors. If a single/skipped point error occurs, you must go back and correct the mistake in the OUT version. After doing so, the file should be run through GIS.CLOSE and PREP again.

11. Run the QUITTER program. This program takes the binary output file of PREP and produces a file which can be plotted. The program allows the user to request any scale (within the limits of paper size); however, the user should request the scale of the original digitized map. The user can select plots with or without labels (line numbers), in four single or multi-colors. More than one plot can be put on top of another by asking for NO advance (of the paper). When plotting layers on top of each other, different layer can be different colors allowing for contrast between plots. Plot files for the CalComp plotter can contain multiple plots within one plot file. Plot files for the laser printer must have only one plot in the file.

COMMAND: QUIT	
2	(For local plots. Use other as needed.)
TYPE OF PLOT: -1	(for Plot Only.)
INPUT FILE: SLST63PREP	(Input file of the output file of the PREP program.)
CRT PLOT: 0	(A zero for NO. A '1' will cause the plot to be drawn on the computer screen. This only works on graphic terminals.)
HARDCOPY PLOT: 1	(A '1' for YES. A zero will not give the user an output file.)
PLOT REG. PTS.: 1	(A '1' for YES.)
LABELS: 1 or 0	(A '1' for YES plot, line segment numbers. A zero for NO, do not plot line numbers.)

PEN OPTIONS: 5	(Usually a '5' for multi-colored plots. For single colors, give number of the color desired.)
SCALE OF PLOT: 24000	(For 1:24000 scale, give 24000. For 1:63360 scale, give 63360. Do not type commas.)
PLOT FILE NAME: SLST63CC	(Name of output file. Usually its the file name with a CC extension for labeled plots and a CCN for unlabeled plots. When several files are in one plot file, this question is asked one time.)
AXIS: 0	(Usually a zero for no border around the plot. Give option desired.)

The program will now run. The first prompt, type of plot, will appear again on the screen. At this point, the user will either continue (type -1) or stop (type 99). When the '99' is given the following prompts are given.

NAME OF FILE TO PLOTTER:	(At this point, the user can send the plot file to the CalComp by typing the name of the plot file (SLST63CC in this example). If the user does not wish to send the plot file at this time, simply press the new line key.)

If the user did not send the plot file to the CalComp plotter from the QUITTER program, the program PLOT will allow the user to send the plot when desired. The CalComp plotter should be up and running before sending plots. Refer to CalComp section for directions on set-up, running, and clean-up of the plotter.

COMMAND: PLOT
NAME OF FILE TO BE PLOTTED: SLST63CC

12. Move the OUT version of the file, which is the updated version, to the storage folder.

COMMAND: FS SLST63OUT	(Note the size of the file.)
COMMAND: X MOVE	
FILES TO BE MOVED: SLST63OUT	
DRAWER NUMBER: 3	(for GIS drawer.)
FOLDER NUMBER: 8	(for SL folder.)
new line key	(Do not delete the files.)

13. Go to the storage folder. Check to make sure the file has been moved completely. Delete the old version and rename the OUT file to the filename.

SHIFT key + F11 key	(Gets back to the folder line of the IS menu.)
FOLDER: SL	(Type in the name of the folder desired.)
COMMAND: FS SLST63+	(Check to see if entire file was moved and that both the former version and the OUT version are present.)

To delete the old version and rename the OUT file, there is a computer program called ROUT. However, this works only if both the former and OUT versions of the file are present and if there are no characters after OUT in the OUT file name. If both conditions are met, then use the program ROUT. If not, ROUT can be used, but will give error messages, or, the former file can be deleted by the DEL/V command, and renamed by the REN command.

COMMAND: ROUT SLST63 (Will delete the former file and rename the OUT file. If there is more than one file, list them with a space between names, i.e. ROUT SLST63 SLST74 SLST75.)

COMMAND: FS SLST63+ (Check to see if the updated version is the file present.)

- OR -

COMMAND: DEL/V SLST63 (Deletes the former file.)
COMMAND: REN SLST63OUT SLST63 (Renames the OUT file.)

COMMAND: FS SLST63+ (Check to see if the updated version is the file present.)

14. Clean-up the WORKING folder. Go back to the WORKING folder and delete the files which were created during processing. Do not delete the OUT file until it has been moved back to the storage file and renamed. If it is deleted prior to moving all the changes are lost and the user will have to completely redo the changes and computer processing. Do not delete the CC files until they have been plotted and good plots obtained.

SHIFT key + F11 key (Gets back to the folder line of the IS menu.)
FOLDER: WORKING (Type in the name of the folder desired.)

COMMAND: FS SLST63+ (Find out all the files created.)

Usually the FS listing will include most of the following: SLST63 SLST63D SLST63OUT SLST63PREP SLST63PREP.LS SLST63CC SLST63CCN

COMMAND: DEL/V SLST63 SLST63D SLST63OUT SLST63PREP+ SLST63CC+
(This will delete all the files.)

15. If there was a newly digitized file or a 'D' file, it will have to be deleted out of the RAW folder. However, it should be deleted only after a daily back-up has been done. For example, if the file was created on a Tuesday and the computer processing was done on the same day, the 'D' file should be deleted the next day (Wednesday) after it has been put on a back-up tape. If the 'D' file was created on a Tuesday and the computer processing done on Wednesday or later, the 'D' file can be deleted when the clean-up is done in WORKING.

NODEMATCH PROCESS

After a group of files, such as SUB maps, have been completed, the adjacent files need to be edgematched together. The first phase of this step is to visually edgematch the files. Line-up adjacent base maps and their plots. Check to see if lines from one plot continue onto the adjacent plot and that the endpoints of the two connecting lines are within 0.03 inches of each other. If the endpoints are too far apart, or overlap too much, they need to be adjusted, i.e. edit the digitized file. This process uses the same procedures given in the Edit and Computer Processing sections.

Once the group of files have been visually edgematched, the computer nodematch program needs to be executed. For the following example on SUB files, there are corresponding diagrams at the end of this section. It is recommended to write the line segment numbers of lines which connect to adjacent maps on the side of the plot. For instance, lines 3, 4, 27, and 29(both ends) at the top of plot A connect to plot B, but not lines 5 and 6. Then at the top of plot A, 3 4 27 29 29 should be written. The line segment numbers on plot B which connect to the lines at the top of plot A should be written at the bottom of plot B. This is done for all sides of every plot.

1. Log on the computer and navigate to the desired folder.

   USERNAME: GUEST.MURIS1 (or GUEST.MURIS2, GUEST.MURIS3)
   PASSWORD: (See MURIS staff for password.)

   HOME OFFICE: R01F10A
   HOME USERNAME: M.MOUSE (first initial.last name)

   Go to the IS environment, then the appropriate folder.
   CTRL key + SHIFT key + F4 key

   1 (1. Access Information)
   3 (3. Other Staff)
   STAFF NAME: MURIS (Staff Name)
   DRAWER: GIS (Drawer Name)
   FOLDER: OTHER (Folder Name, Index (SHIFT + F2) key for possible choices.)

2. Move the needed file(s) from the storage folder to the WORKING folder, using the X MOVE or MOW program. When the disk is near capacity, files are not moved completely. To check for this problem, note the size of the file before moving, then check the size of the file moved to WORKING.

   COMMAND: FS SUB1 SUB2 SUB3 SUB4 SUB5 SUB6
   (Note the size of the file.)

   COMMAND: MOW
   ENTER FILENAMES TO BE MOVED TO WORKING: SUB(1 2 3 4 5 6)
   (List filename(s) to be moved.)

- OR -

COMMAND: X MOVE

FILES TO BE MOVED: SUB1 SUB2 SUB3 SUB4 SUB5 SUB6	(Either list the files or they can be grouped, for example SUB(1 2 3 4 5 6).)
DRAWER NUMBER: 3	(for GIS drawer)
FOLDER NUMBER: 16	(for WORKING folder)
newline key	(DO NOT delete the file, just press the new line key)

3. Go to the WORKING folder. Check to see if the entire file(s) were moved by comparing the size of the file in WORKING to the size of the original file in the storage folder.

SHIFT key + F11 key	(This will go back to the folder line in the IS menus.)
FOLDER: WORKING	(Type the folder name you want.)

4. Run the PREP program. Using the header file, this program converts the tablet inch file into a binary file of the UTM coordinates. The program, NODEMATCH, only works on binary files. At this time, the files should be complete; however, it is a good idea to check the RMS error and look for single points or segments skipped errors as the program scrolls by. These errors will need to be fixed if they occur.

COMMAND: X PREP

1	(for Numonics)
MASTER INPUT FILE: 1	(Give the header file name.)
RAW DATA FILE: SUB1	(Input file is the original file in this process.)
OUTPUT FILE: SUB1PREP	(Always use a PREP extension.)
DISCRETE POINTS: 0	(A zero means NO and it is line data, a '1' means YES and it is single point data.)
CHANGE BANNER: 0	(A zero means NO. At this step, it does not matter what the banner reads. These files will not be plotted yet.

As the program scrolls by, check for the RMS error. Is it acceptable? Also watch for single or skipped point errors. If a single/skipped point error occurs, you must go back and correct the mistake in main file. After doing so, the file should be run through GIS.CLOSE and PREP.

5. Run NODEMATCH program on all sides of each quad. Each quad side has to be edgemtached separately, hence for each quad the program NODEMATCH will be run up to four times. Two files are entered as input into the program. One file is held, coordinates for connecting lines will not change. The other file is changed, coordinates for connecting lines are altered to exactly match the lines on the adjacent quad. An area of closure is chosen which will match the connecting lines without affecting the non-matching lines. If the closure is too large, other lines will be affected. If the closure is too small, not all the connecting lines will be matched. The circle of closure to search for nodes in NODEMATCH is in meters. The following is a conversion chart between inches on the digitized map and meters on the ground. On a 1:24000 scale map, one meter on the ground = .0016" on the map.

On ground	*On map*	*On ground*	*On map*
10 Meters	= .016"	60 Meters	= .098"
20 Meters	= .032"	70 Meters	= .115"
30 Meters	= .049"	80 Meters	= .131"
40 Meters	= .065"	90 Meters	= .148"
50 Meters	= .082"	100 Meters	= .164"
12.5M	= .02 "		

The NODEMATCH program will list the line segments which are altered for the changed file. These need to be checked against a list the lines which should be changed (done prior to starting NODEMATCH program). The output for the program are three files:

a file with an .NO extension - used by the program itself. Ignore.
a file with an .NM extension - a binary PREP file. Rename to filePREP#.
a file with an .NU extension - an inch file. Rename to fileOUT#.

a. Run NODEMATCH on the first side of the quad.

COMMAND: NODE (Executes the program. If any .NO files exist, program will delete them.)
INPUT FILE TO BE HELD: SUB1PREP
RMS CLOSURE: 15 (Chose the appropriate value.)

INPUT FILE TO BE CHANGED: SUB2PREP
RMS CLOSURE: 15 (Use the same value.)

Program will list the segments which have been changed. If everything is okay, rename the output files and mark the index map (Diagram 1).

COMMAND: REN SUB2PREP.NM SUB2PREP1
(Rename the PREP output file.)
COMMAND: REN SUB2PREP.NU SUB2OUT1
(Rename the OUT output file.)

b. Run NODEMATCH on the second side of the quad. Remember that the input on this side will be the output from the previous run of NODEMATCH.

COMMAND: NODE
INPUT FILE TO BE HELD: SUB5PREP
RMS CLOSURE: 15

INPUT FILE TO BE CHANGED: SUB2PREP1
(The input file should be the most recent PREP version, the output of the last NODE run.)
RMS CLOSURE: 15

Program will list the segments which have been changed. If everything is okay, rename the output files and mark the index map (Diagram 2).

COMMAND: REN SUB2PREP1.NM SUB2PREP2
(Rename the PREP output file.)
COMMAND: REN SUB2PREP1.NU SUB2OUT2
(Rename the inch output file.)

c. Run NODEMATCH on the third side of the quad. Remember that the input on this side will be the output from the previous run of NODEMATCH.

COMMAND: NODE
INPUT FILE TO BE HELD: SUB3PREP
RMS CLOSURE: 15

INPUT FILE TO BE CHANGED: SUB2PREP2
(The input file should be the most recent PREP version, the output of the last NODE run.)
RMS CLOSURE: 15

Program will list the segments which have been changed. If everything is okay, rename the output files and mark the index map (Diagram 3).

COMMAND: REN SUB2PREP2.NM SUB2PREP3
(Rename the PREP output file.)
COMMAND: REN SUB2PREP2.NU SUB2OUT3
(Rename the inch output file.)

d. Run NODEMATCH on the fourth side of the quad, if needed.

5. Repeat step 4 "Run NODEMATCH" for each quad as needed. For instance, since SUB2 has already been edgematched to SUB1, SUB1 only needed edgematching to SUB4. When all sides of all quads have been nodematched, the index map should look like Diagram 4.

6. After the quads have been nodematched, the latest OUT version of each file is moved back to the storage folder. Due to the number of files created, the user may not wish to wait until all quads have been nodematched before cleaning up the files. It is recommended that as a tier of maps, or quads, are nodematched the clean-up process is completed for that tier.

COMMAND: FS SUB2OUT3 SUB4OUT3 SUB6OUT4
(Note the size of the files.)
COMMAND: X MOVE
FILES TO BE MOVED: SUB2OUT3 SUB4OUT3 SUB6OUT4
DRAWER NUMBER: 3 (for GIS drawer.)
FOLDER NUMBER: 1 (for COMPLETE folder.)
new line key (Do NOT delete the files.)

7. Go to the storage folder, check to see if the entire file is moved. Delete the old version and rename the OUT version of the file.

SHIFT key + F11 key (This will go back to the folder line in the IS menu.)
FOLDER: COMPLETE (Type the folder name you want.)

COMMAND: FS SUB2+ SUB4+ SUB6+ (Check to see if entire file is moved by comparing the size of file in this folder to the one in WORKING.)
COMMAND: DEL/V SUB2 SUB4 SUB6 (Delete the old version.)
COMMAND: REN SUB2OUT3 SUB2 (Rename the OUT version.)
COMMAND: REN SUB4OUT3 SUB4
COMMAND: REN SUB6OUT4 SUB6

8. Go back to the WORKING folder and clean-up the files.

SHIFT key + F11 key (This will go back to the folder line in the IS menu.)
FOLDER: WORKING (Type the folder name you want.)

COMMAND: FS SUB1+ (List files associated with SUB1.)

The list for a file which was held should include: SUB1 SUB1PREP SUB1PREP.LS
All of these can be deleted.

COMMAND: DEL/V SUB1 SUB1PREP+

COMMAND: FS SUB2+ (List files associated with SUB2.)

The list for a file which was changed should include: SUB2 SUB2OUT1 SUB2OUT2 SUB2OUT3 SUB2PREP SUB2PREP1 SUB2PREP2 SUB2PREP3 SUB2PREP.LS
Once the latest OUT version has been moved, all of these files can be deleted.

COMMAND: DEL/V SUB2 SUB2OUT+ SUB2PREP+

Continue the clean-up for the remaining SUB files.

9. TROUBLESHOOTING.

a. If not all the lines were nodematched:

1) Delete the SUB_PREP_.N+ output files for the side which did not work.

2) Rerun NODE, but increase the RMS closure by 5.

Keep repeating 1 and 2 until all lines are correctly nodematched without extra lines, or until the RMS closure is at 45 for 1:24000 scale maps and 65 for 1:63360 scale maps.

b. If RMS closure is high and lines are not nodematching, the inch file will have to be changed. NOTE: Change the previous OUT version (the last nodematched side which correctly worked).

1) Change the previous (last correct) OUT version. Moving the endpoint of the problem line closer to the adjacent quad's line endpoint.

2) Run through GIS.CLOSE. Watch what you name the output file!

3) Rerun the PREP program using the GIS.CLOSE output. Watch what you call the output! It should be the PREP version to match the OUT version you just altered.

4) Try NODE again.

c. On rare occurrences, a line which is joined at a lower RMS closure value will not be joined at a higher RMS closure value. In this case, use two different RMS closure values, one for the held file and a different one for the changed file.

d. Also, rarely, two lines to be joined will already be within 1 or 2 meters, and never appear in the list of altered lines because they were never altered. These can only be checked by printing the UTM files.

1) Run GIS.ASC on each of the latest PREP versions. Initiate the program by GIS.ASC and will prompt the user for the filename. The output will have the same name, but with an .AS extension.

2) Run the .AS extension files through the GIS.PRINT program. Use the printouts to check the UTM coordinates of the endpoints in question.

10. After ALL the files for the group, or layer, are nodematched on ALL sides, a new plot should be made of each file. To create a new plot, repeat the steps in the COMPUTER PROCESSING section. The GIS.CLOSE program should be run with a closure gap of 0.001. Check for single point or segment skipped errors in PREP. A visual check is then done to check for errors, such as lines edgematched to the wrong endpoint of a line, or jogs made when the endpoints were changed. These errors should be corrected.

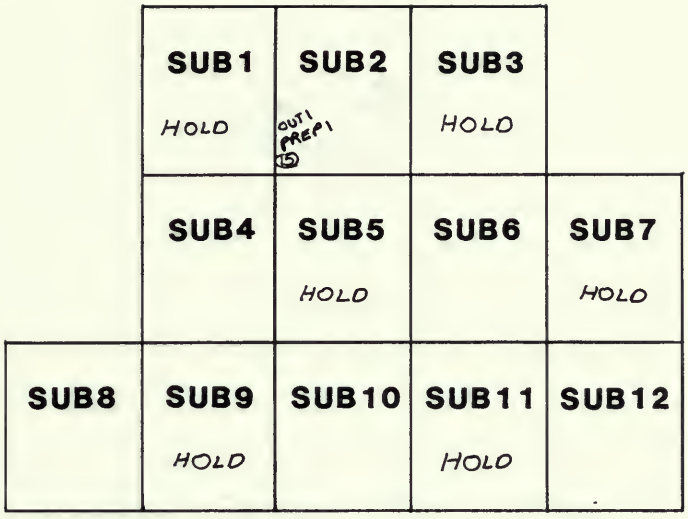


Diagram 1. Index map for NODEMATCH run on first side of quad. NOTE: Every other quad is held, and lines on the remaining quads are adjusted to match the lines on the held quad.

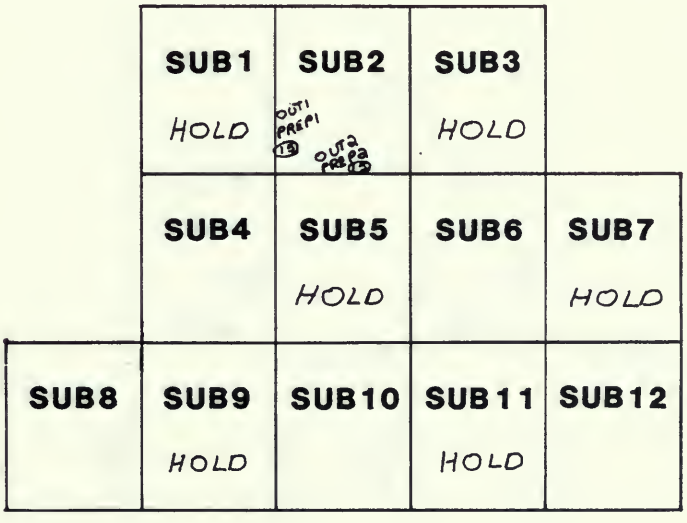


Diagram 2. Index map for NODEMATCH run on side two of the quad.

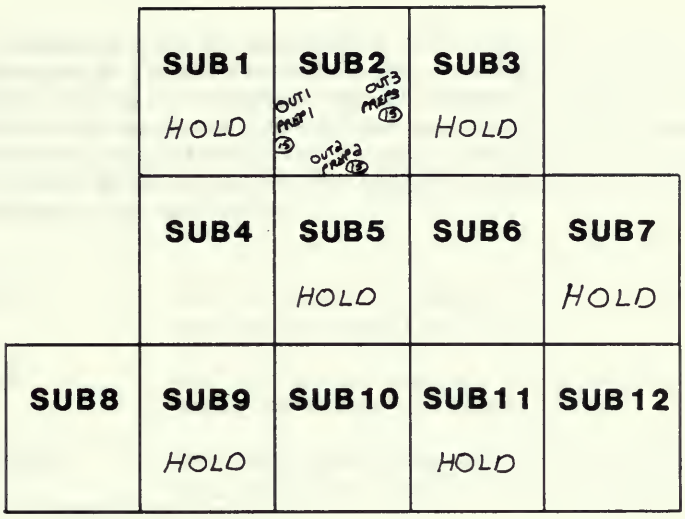


Diagram 3. Index map for NODEMATCH run on third side of quad.

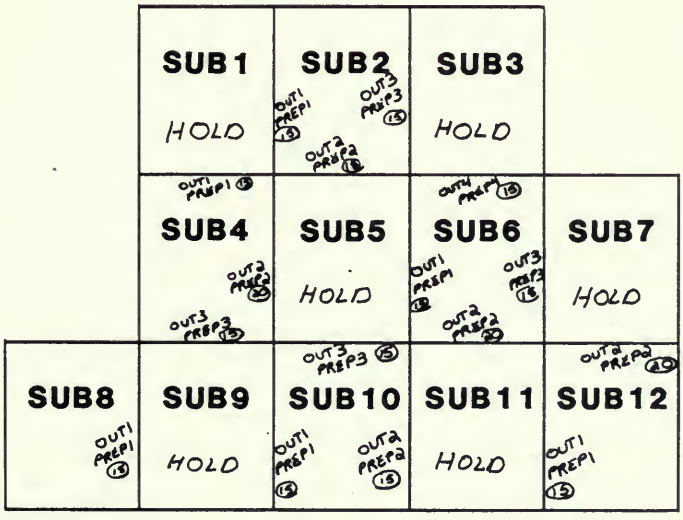


Diagram 4. Index map for NODEMATCH after all quads have been nodematched.

CLASSIFICATION OF LINE SEGMENTS

Classification of line segments is the final step before a layer is converted to the ERDAS system. This process currently changing so the user should check with the MURIS staff before completing this step. Classification involves assigning the attributes to each line segment on each plot. This step may be done with paper and pencil, on the screen using ERDAS software, or a combination thereof. For each plot, compile a list of all the line segments broken into the various categories for each respective type of map. On these lists, the heading should consist of a main category, and underneath list all the line segment numbers in that category for that quad or map.

ROADS:	Each line segment is assigned a road number, type of ownership, use level, and season of closure.
TRAILS:	Each line segment is assigned a trail number, ownership, use level if known, and whether it is a historical trail.
STREAMS:	Each line segment is classified as to whether it is a perennial or intermittent stream, lake, intermittent lake, glacier, marsh, spring, etc.
	If the line is a stream: indicate first, second, or third order.
FISHERIES:	Information is pulled off the STREAM maps. Line segments and/or junctions which have reach, spawning, barrier, coring site, and fish presence attributes are compiled into the appropriate lists.
TIMBER STANDS:	A list is compiled for each compartment and subcompartment. The line segments which comprise the boundary of those compartments is listed underneath.

PROJECT VECTOR PLOTS

This section deals with creating vector plots for various projects, such as all streams in the Swan Valley, streams plotted in blue ink and roads in black ink for a sub-basin drainage, or roads and ownership for a district. There are two main processes. First all line segments from several files can be combined into one file or specific line segments from the data files can be combined. Second, two or more different layers of information can be plotted on top of each other in different ink colors. In the following example, sub-basin drainages for a major stream were to be plotted over the hydrology layer. The line segments dealing with the sub-drainages needed were pulled from the SUB data files and combined into one file. All line segments dealing with the hydrology of the major stream were combined into another file. These two files were then plotted on top of each other, sub-basin drainages in black and the hydrology in blue.

SUB layer:

1. Log on to the computer and navigate to the storage folder for SUB data files. Move the files which cover the sub-basin drainages needed from the storage folder to the WORKING folder with the X MOVE or MOW program.

COMMAND: MOW

ENTER FILENAMES TO MOVED TO WORKING: SUB(1 2 3 3A 4 5 6 7)
(List filename(s) to be moved.)

- OR -

COMMAND: X MOVE (This program moves data files from one folder to any other folder in the MURIS staff area.)

FILES TO BE MOVED: SUB1 SUB2 SUB3 SUB3A SUB4 SUB5 SUB6 SUB7
(List the data files separately, or by SUB(1 2 3 3A 4 5 6 7)).

DRAWER: 3 (for GIS drawer.)

FOLDER: 1 (for WORKING drawer.)

new line key (Do NOT delete the files!)

2. Go to the WORKING folder, check to see if the entire file is there.

SHIFT key + F11 key (This will go back to the folder line in the IS menu.)

FOLDER: WORKING (Type the folder name you want.)

COMMAND: FS SUB+ (Check to see if each file was completely moved.)

3. Run the PREP program on each file. Using the header file, this program converts the tablet inch file into a binary file of the UTM coordinates. Files need to be in a binary format in order to join them together. At this time, the files should be complete; however, it is a good idea to check the RMS error and look for single points or segments skipped errors as the program scrolls by. These errors will need to be fixed if they occur.

COMMAND: X PREP

1	(for Numonics)
MASTER INPUT FILE: 1	(Give the header file name.)
RAW DATA FILE: SUB1	(Input file is the original file in this process.)
OUTPUT FILE: SUB1PREP	(Output file always has a PREP extension.)
DISCRETE POINTS: 0	(A zero means NO and it is line data, a '1' means YES and it is single point data.)
CHANGE BANNER: 0	(A zero means NO. At this step, it does not matter what the banner reads. These files will not be plotted yet.

As the program scrolls by, check for the RMS error. Is it acceptable? Also watch for single or skipped point errors. If a single/skipped point error occurs, you must go back and correct the mistake in main file. After doing so, the file should be run through GIS.CLOSE and PREP.

4. Run GIS.FLIP program. This program switches the coordinates from a X,Y format to a Y,X format which GIS.JOIN uses. The output is a TXT file.

COMMAND: GIS.FLIP

INPUT FILENAME: SUB1PREP	
OUTPUT FILENAME: SUBPRP1	(The output files all need to the same first 6 characters with the file reference number after.)

COMMAND: GIS.FLIP

INPUT FILENAME: SUB2PREP	
OUTPUT FILENAME: SUBPRP2	

Continue running GIS.FLIP for each file.

5. Run the GIS.JOIN program. This program joins files together, but with the option of choosing which line segments.

COMMAND: GIS.JOIN

OUTPUT FILENAME: SUBALL	(Use something which can be recognizable.)
ENTER FIRST 6 CHARACTERS OF INPUT FILENAMES: SUBFLP	(SUBFLP is the output prefix from GIS.FLIP.)
INPUT FILE NUMBER OR END: 1	(for SUBFLP1 file.)
LIST SEGMENT NUMBERS	
1-5,6,7,9-14:	(List segment numbers and end with a colon. Use 1-9999: if all segments desired.)
INPUT FILE NUMBER OR END: 2	(for SUBFLP2.)
LIST SEGMENT NUMBERS	
5,9,13,17-18	
INPUT FILE NUMBER OF END:	(Continue until all files are completed. When done type 'END' at this prompt.)

6. Run X JELLY program. The output from GIS.JOIN is a TXT file with an Y,X coordinate format. The JELLY program switches the data file into a binary X,Y format just like the output from PREP. The output from X JELLY can then be used in the QUITTER program.

COMMAND: X JELLY

WHAT NOW? 1	(for PREP.)
WHICH? 8	(for FIELD DATA.)
MASTER FILENAME? SWAK	(Dummy header, always use SWAK.)
RAW DATA INPUT: SUBALL	(Output file from GIS.JOIN.)
BINARY OUPUT FILENAME: SUBPREP	
POINTS(1), LINES(2), POLYGONS(3): 2	(Most data files are line data.)
XY(1) OR YX(2): 2	(Always.)
FORTRAN FORMAT: (F8.0,F8.0)	(Always.)
CHANGE PLATE NAME? Y	(for Yes.)
GVST-SUB MAP, UPPER N. FK	(Type in banner/plate name, up to 25 characters.)
SCALE OF ORIGINAL MAP: 24000	(Put in appropriate value.)

Program will now scroll through and stop at first prompt.

WHAT NOW? new line key	(Will exit program. User can continue with another file by responding with a '1'.)

STREAM layer:

1. Navigate to the storage folder for the GVST data files. Move the files needed from the storage folder to the WORKING folder with the X MOVE or MOW program.

COMMAND: MOW

ENTER FILENAMES TO BE MOVED TO WORKING: GVST(1 2 3 3A 4 5 6 7)
(List filename(s) to be moved.)

- OR -

COMMAND: X MOVE	(This program moves data files from one folder to any other folder in the MURIS staff area.)
FILES TO BE MOVED: GVST(1 2 3 3A 4 5 6 7)	
DRAWER: 3	(for GIS drawer.)
FOLDER: 1	(for WORKING drawer.)
new line key	(Do NOT delete the files!)

2. Go to the WORKING folder, check to see if the entire file is there.

SHIFT key + F11 key	(This will go back to the folder line in the IS menu.)
FOLDER: WORKING	(Type the folder name you want.)
COMMAND: FS GVST+	(Check to see if each file was completely moved.)

3. Run the PREP program on each file. Using the header file, this program converts the tablet inch file into a binary file of the UTM coordinates. Files need to be in a binary format in order to join them together. At this time, the files should be complete; however, it is a good idea to check the RMS error and look for single points or segments skipped errors as the program scrolls by. These errors will need to be fixed if they occur.

COMMAND: X PREP

1	(for Numonics)
MASTER INPUT FILE: 1	(Give the header file name.)
RAW DATA FILE: GVST1	(Input file is the original file in this process.)
OUTPUT FILE: GVST1PREP	(Output file always has a PREP extension.)
DISCRETE POINTS: 0	(A zero means NO and it is line data, a '1' means YES and it is single point data.)
CHANGE BANNER: 0	(A zero means NO. At this step, it does not matter what the banner reads. These files will not be plotted yet.

As the program scrolls by, check for the RMS error. Is it acceptable? Also watch for single or skipped point errors. If a single/skipped point error occurs, you must go back and correct the mistake in main file. After doing so, the file should be run through GIS.CLOSE and PREP.

4. Run X JOINER program. This program joins complete files together into one binary output file. It has the option of selecting out an area of interest from the combined files. If the user wishes to select out an area, it is extremely recommended that the user joins the files first and then rerun X JOINER to select out the area.

COMMAND: X JOINER

NO. OF FILES TO JOIN? 7	(Enter the total number of files to be joined in this run, up to maximum of nine files.)
FILENAME: GVST1PREP	
FILENAME: GVST2PREP	
. .	
FILENAME: GVST7PREP	
OUTPUT FILENAME: GVSTPREP	(Use a name that is recognizable.)
NEW PLATENAME: GVST-SUB MAP, N FK	
PRELIMINARY PLOT? 0	(Always.)

Program will now display the area and map boundaries on the screen.

CLOSURE? 10	(Always. This is similar to the area of closure for nodematch.)
CUT-LINE/CTRL-D: CTRL key + D	(Even if a section of the joined area is desired, only join the files on the first run. Do not attempt to section out an area yet.)

Program will now run with a series of commands down the right side.

FINAL PLOT: 0	(Always.)

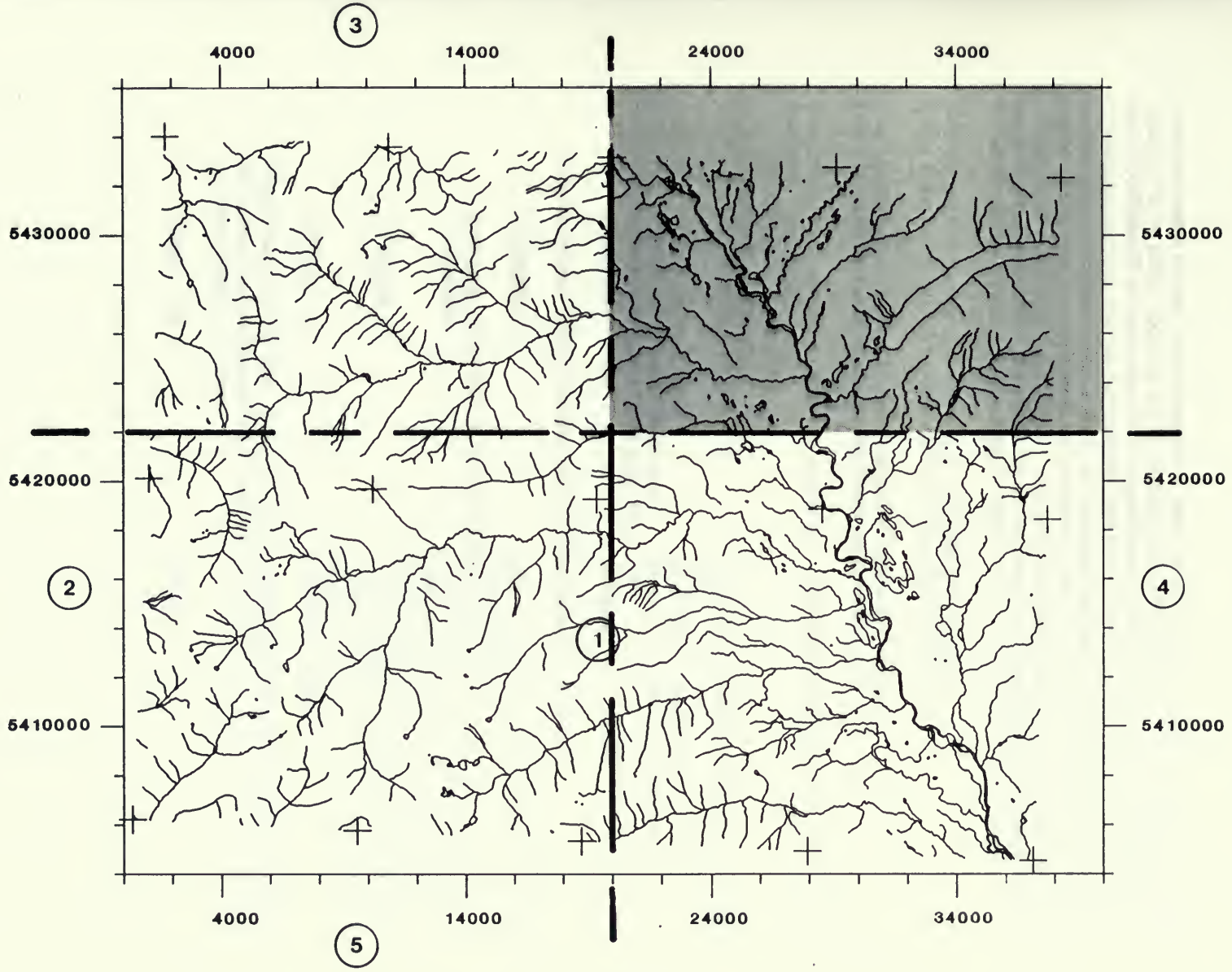


Figure 1. CRT Screen for X JOINER program with area of interest shaded.

5. If the user needs to select out an area of the joined files, rerun the X JOINER program. If multiple layers are to be plotted together, the same area should be selected out for each layer. At the CUT LINE COORDINATE prompt, enter the UTM coordinates. There are four numbers separated by commas for each cut. The first two numbers refer to file numbers assigned by the program. The one file displayed on the screen is file 1, with imaginary files around the sides (circled numbers in Figure 1). The third number refers to the UTM coordinate used as the break for the cut. The fourth number refers to the type of cut, a one, '1', for vertical cuts and a zero, '0', for horizontal cuts. Depending on whether file 1 is listed as the first or second number determines whether the area to the left or right on a vertical cut or the top or bottom on a horizontal cut is thrown away.

If file 1 is the first number on a vertical cut, right side is thrown away.
If file 1 is the first number on a horizontal cut, bottom part is thrown.

If file 1 is the second number on a vertical cut, left side is thrown away.
If file 1 is the second number on a horizontal cut, top part is thrown.

Even though the cut is being performed only on file 1, the appropriate imaginary file number is needed by the program.

COMMAND: X JOINER

NO. OF FILES TO JOIN? 1	(Enter 1 since all the files are joined into one file.)
FILENAME: GVSTPREP	(The output from the previous run.)
OUTPUT FILENAME: GVSTFINAL	(Use a name that is recognizable.)
NEW PLATENAME: GVST-SUB MAP, N FK	
PRELIMINARY PLOT? 0	(Always.)

Program will now display the area and map boundaries on the screen.

CLOSURE? 10	(Always. This is similar to the area of closure for nodematch.)
CUT LINE COORDINATE, CTRL-D AFTER LAST CUT	
1,5,5422000,0	(For horizontal cut, throwing away the map below the 5422000 UTM north coordinate. Refer to Figure 1.)
2,1,200000,1	(For vertical cut, throwing away the map to the left of 200000 UTM east coordinate. Refer to Figure 1.)
CTRL key + D	(After last cut given.)

Program will place the lines at the cut mark. If the lines are in the wrong place, simply write the cut line again correctly BEFORE pressing CTRL-D. Refer to Figure 1 for an example of the screen and the cut lines.

FINAL PLOT: 0	(Always.)

PLOTTING files:

1. It is recommended to obtain a laser plot of each individual layer before creating the CalComp plot of the combined layers.

COMMAND: QUIT

3	(For laser plots.)
TYPE OF PLOT: -1	(for Plot Only.)
INPUT FILE: GVSTFINAL	(The final joined copy for the streams.)
CRT PLOT: 0	(A zero for NO.)
HARDCOPY PLOT: 1	(A '1' for YES. A zero will not give the user an output file.)
PLOT REG. PTS.: 1	(A '1' for YES.)
LABELS: 0	(At this point the user does not need line segment numbers.)
PEN OPTIONS: 1	(Does not matter as much for laser plots since it is all black and white. Selection is '1' for solid lines, '2' for dashed lines, '3' for dotted lines, '4' for dot-dash lines, '5' for combination.)
SCALE OF PLOT: 24000	(The scale will be adjusted automatically to fit the laser printer.)
PLOT FILE NAME: GVSTLASER	(Name of output file. Use some sort of extension to signify a laser plot.)
AXIS: 1	(A border is useful around the laser plots, especially for figuring UTM coordinates.)

The program will now run. The first prompt, type of plot, will appear again on the screen. Since only one laser plot can be sent at a time, type '99' to stop.

TYPE OF PLOT: 99	(To stop program.)
NAME OF FILE TO PLOTTER:	(Laser plots can be sent to the printer from this prompt.)

- OR -

COMMAND: LASERB (Initiates program to send laser plots to the laser printer.)

BINARY FILE TO LASER PRINTER: GVSTLASER

WHICH PRINTER? LDP3=3 LDP4=4: 4

(LDP412P is given as a default.)

2. If the laser plots are okay, execute the QUITTER program to plot the two data layers on top of each other and plot on the CalComp plotter.

COMMAND: QUIT	
2	(For local plots. Use other as needed.)
TYPE OF PLOT: -1	(for Plot Only.)
INPUT FILE: SUBPREP	
CRT PLOT: 0	(A zero for NO. A '1' will cause the plot to be drawn on the computer screen. This only works on graphic terminals.)
HARDCOPY PLOT: 1	(A '1' for YES. A zero will not give the user an output file.)
PLOT REG. PTS.: 1	(A '1' for YES.)
LABELS: 0	(The user does not need line segment numbers of final project maps.)
PEN OPTIONS: 1	(Black was selected for sub-basin drainages lines.)
SCALE OF PLOT: 24000	(For 1:24000 scale, give 24000. For 1:63360 scale, give 63360. Be sure that the plot at the given scale will fit on 30 inch paper. Do not type commas.)
PLOT FILE NAME: SUB.GVSTCC	(Name of output file.)
AXIS: 0	(Usually a zero for no border around the plot. Give option desired.)

The program will now run. The first prompt, type of plot, will appear again on the screen. At this point, the user needs to continue (type -1) and enter the second data layer.)

TYPE OF PLOT: -1	(for Plot Only.)
INPUT FILE: GVSTFINAL	(Input second data file.)
CRT PLOT: 0	A zero for NO. A '1' will cause the plot to be drawn on the computer screen. This only works on graphic terminals.)
HARDCOPY PLOT: 1	(A '1' for YES. A zero will not give the user an output file.)
LABELS: 0	
PEN OPTIONS: 4	(User decided to plot stream lines in blue.)
KEEP SAME PLOTTER ORIGIN(0) OR ADVANCE(1): 0	(To plot two layers on top of each other, type zero.)

The program will now run. The first prompt, type of plot, will appear again on the screen. At this point, the user will either continue (type -1) or stop (type 99). When the '99' is given the following prompts are given.

NAME OF FILE TO PLOTTER:	(At this point, the user can send the plot file to the CalComp by typing the name of the plot file. If the user does not wish to send the plot file at this time, press the new line key.)

If the user did not send the plot file to the CalComp plotter from the QUITTER program, the program PLOT will allow the user to send the plot when desired. The CalComp plotter should be up and running before sending plots. Refer to CalComp section for directions on set-up, running, and clean-up of the plotter.

COMMAND: PLOT
NAME OF FILE TO BE PLOTTED: SUB.GVSTCC

3. Clean-up the WORKING folder. List and delete the files used and created during the processing. Since the user has not changed any of the original files, these files do not have to be moved back to their storage folder. Do not delete the CC or laser plot files until they have been plotted and good plots have been obtained.

COMMAND: FS SUB+ GVST+ (Find out all the files created.)

The FS listing will include all files starting with the letters SUB and GVST. If a good final vector plot has been obtained, the user can delete all of the SUB and GVST files in the above FS listing. Be careful about using the wildcard character '+'.

COMMAND: DEL/V SUB+ GVST+ (This will delete all the files which start SUB and GVST.)

CALCOMP PLOTTER

All users should receive instruction from Jim Reid or Kathy Ake in the MURIS group, or Vienna Manning in the computer section BEFORE attempting to use the plotter. The written instructions given here are not meant to be all inclusive nor all encompassing. There is a 1040GT plotter manual with the plotter in the computer room.

START-UP:

1. Check to make sure that the paper is loaded properly, Figure 1. The paper on the take-up roll should be wrapped around the cardboard roll once or twice. The paper should be looped down about two-thirds or the way into each vacuum column. The two locking levers above both ends of the sprocket drum should be in the down position. The user should also note the amount of paper on the supply roll. It is not recommended to send more plot files to the plotter than there is paper to plot them. It crashes the machine, rips paper, and will require the user to send all the plot files a second time.

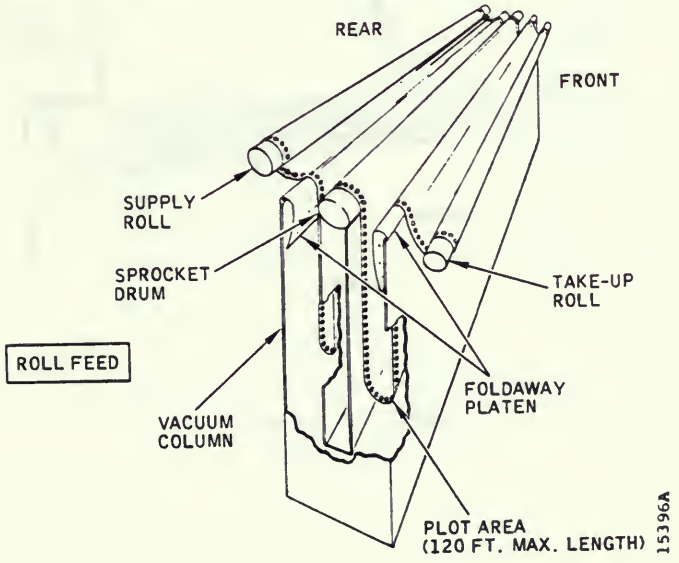


Figure 1. Loading on a sprocketed drum.

2. The pens currently being used are stored tip up on the control panel. Remove the caps, and test the pens at the edge of the paper on the take-up roll. Place the pens in positions 1-4 in the turret, Figure 2. It is easier to load the pens with the turret off the carriage assembly, but it is not necessary. The pen order is: black, green, red, blue. If the user is plotting non-MURIS plots, put in the appropriate pens for that project.

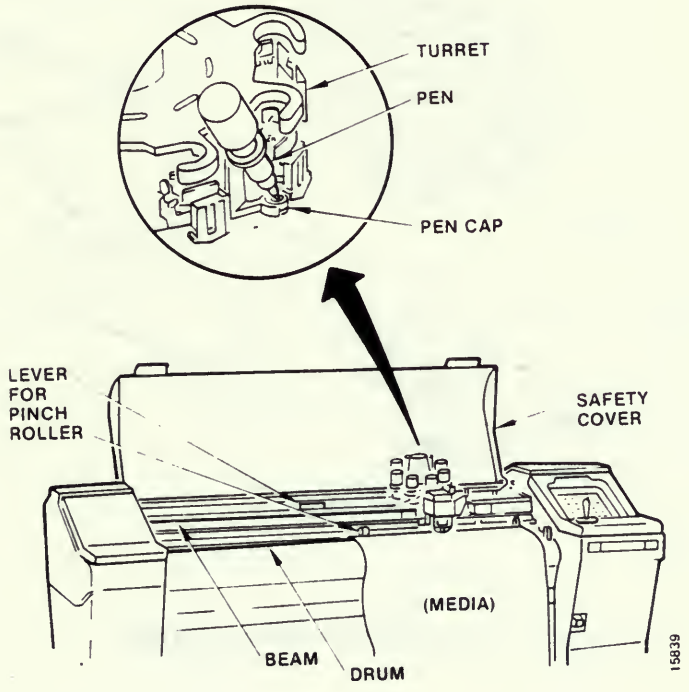


Figure 2. Pen insertion.

Place the turret back on the carriage assembly, Figure 3. The pin on the carriage assembly must be flush with the top of the turret. Put the cover down.

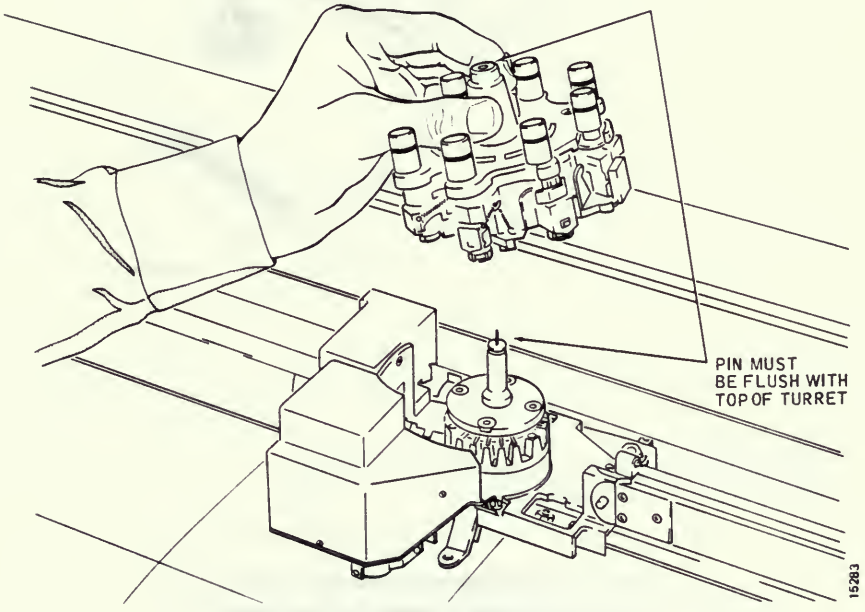


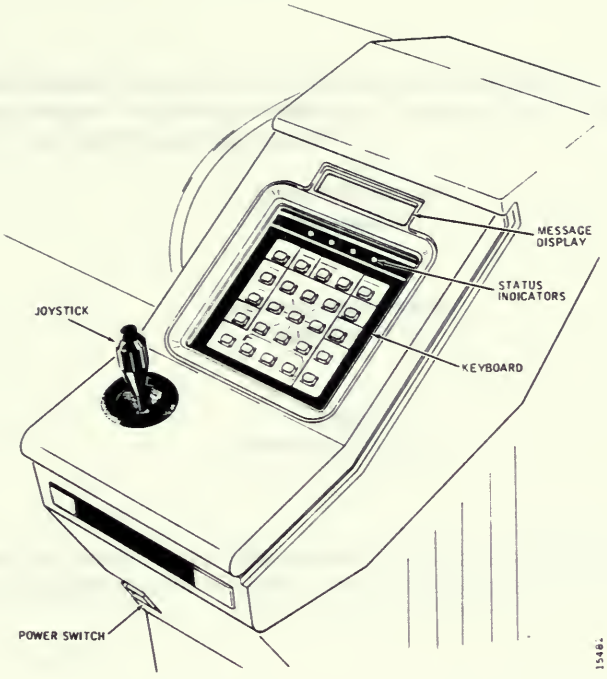
Figure 3. Carriage assembly and turret placement.

3. Turn the power switch on, refer to Figure 4. This will also cause the turret to be initialized, and swirl around on its carriage assembly. The message display should read:

Copyright 1985
* * CalComp * *

TURRET INIT
Please stand by

Position Carriage &
Load Paper Please



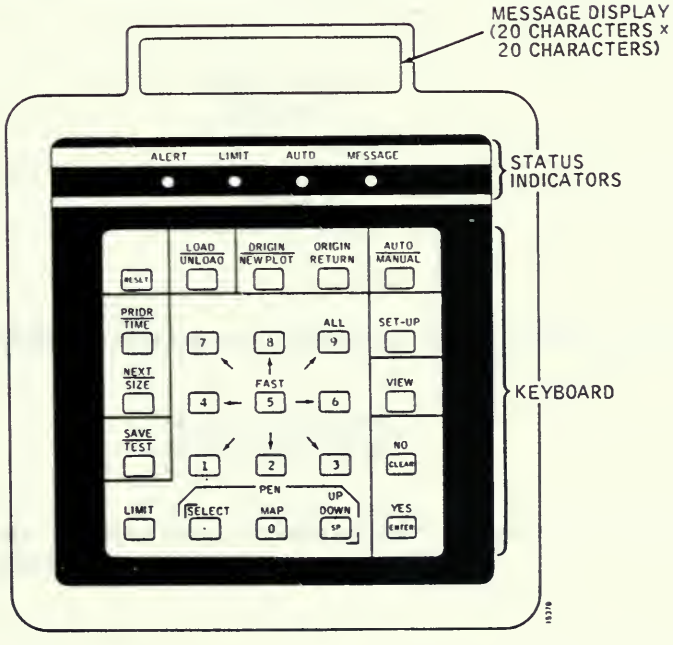


Figure 4. Control panel.

4. Press the LOAD/UNLOAD black button on the top row of the keyboard. This will turn on the vacuum in each vacuum column. The carriage assembly will also slide back across to both ends of the roll to determine the size of the paper being used.

Turning ON Vacuum
Please stand by

Seeking paper edges
Please stand by

Ready
Press AUTO to plot

5. Often when the load key is pressed, the machine will take up paper onto the take-up roll. Use the joystick to roll the paper back off the take-up roll until the paper is wrapped around the roll one or two times.

6. Using the joystick, move the carriage assembly to the left and line-up the gray circular piece with the taped arrow on the cover. Press ORIGIN/NEW PLOT, black key top row of control panel, followed by the YES key, green key labeled ENTER in lower right corner of control panel. Message display should read:

Origin new plot?
Yes or No

Ready
Press AUTO to plot

7. Press the AUTO/MANUAL key, blue key upper right corner. Message display should read:

AUTO TIME: 00:00:00
PLOT TIME: 00:00:00

Time on the auto "clock" should be going. Plot time will run only while there is a plot currently going to the plotter and being plotted.

8. Go back to the DG computer terminal and send the plot file(s) to the plotter. Do not send the plot file(s) to the plotter until the plotter is up and running, steps 1-7 have been completed.

WHILE PLOTTER IS RUNNING:

1. If a pen runs out of ink, the pen can be replaced while the machine is plotting. Press AUTO/MANUAL and lift the cover up. Take the bad pen out and replace it with a new pen. Lower the cover and press AUTO/MANUAL to restart the plot. The plotter will continue where it left off without any data being lost.

AFTER PLOTS ARE DONE:

1. Press AUTO/MANUAL.

2. Press LOAD/UNLOAD. Since the vacuum is on, this will turn the vacuum off. Be careful not to have nads, hair, or noses near the take-up roll, the machine will feed the plots onto the take-up roll rather fast.

3. Place two pieces of tape, 1-2 inches long, within reach. Use the paper cutter provided to cut the plot paper in the groove at the front of the machine, at the top of the vacuum column. Be sure to hold onto both edges of the cut paper, otherwise it will slip down into the vacuum column.

4. Tape the take-up roll paper with the plots and remove the roll. Replace the roll with an empty cardboard roll.

5. Tape the paper onto the new take-up roll. Be sure the it is straight, not crooked on the roll so that the paper will feed properly. If it is uneven it will affect take-up, wrinkle and tear paper, causing lines on the plot to shift, and the machine may crash.

6. If more plots are needed, complete steps 4-8 of START-UP. If not, remove and cap the pens. Turn off the machine at the power switch.

INSERTING NEW ROLL OF PAPER:

1. Machine is off. Take off the remaining paper and supply roll.

2. Place an empty cardboard roll in the take-up roll position. Usually this is the roll from the supply roll just used.

3. Put a new roll of paper on the supply roll springs, so that the paper feeds from underneath.

4. Pull the paper underneath the carriage assembly, but over the sprocket drum, and out another three feet.

5. Drop a loop of paper into the front vacuum column.

6. Place the holes at the edges of the paper on the sprockets. Use the red tick marks on the edges of the paper to insure lining the paper straight.

7. Tape the end of the paper onto the take-up roll. Be sure its falling off the sprocket roll straight and not crooked.

8. Roll paper off the supply roll into the back vacuum column about two thirds down the well.

9. From the paper supply in the room, open a new roll, remove the plastic, and put the roll back in the box. The paper needs to breathe, acclimate to the rooms humidity. Leave the roll against the well at the left of the plotter.

10. User is ready for START-UP.

MURIS GLOSSARY - FNF

ACCURACY - In terms of mapping "accuracy" is the completeness and correctness of illustrating the landscape for a specific purpose.

ADDRESS - A number referring to a location in computer memory.

ANALOG FORMAT - Data stored or displayed directly, as a map or a watch with hands.

ARC - More than one vector that forms a curved or segmented line.

ARRAY PROCESSOR - A computer designed to operate simultaneously, or in parallel on many elements of an array.

ASPECT - The horizontal direction in which a slope faces.

ATTRIBUTE - A label for the characteristics of an area, or heading of spatial data.

ATTRIBUTE IDENTIFIER - Value used to link the attribute to the spacially located polygon, line, or point data.

AUDIT TABLE - In a GIS, a table of information describing a maps subjects, items, perimeter, and areas.

BAND - A range of wavelengths in the electromagnetic spectrum.

BASE MAP - Mapped data which seldom changes and which is used repeatedly.

BASIC DATA - Defined features, boundaries, such as streams and roads. Boundaries are exact.

BOOLEAN OPERATION - Logical combinations of data, involving union, intersection, complement, and exclusion.

CARTOGRAPHIC MODEL - A flow diagram depicting a process of combining and analyzing multiple layers of mapped information to create a new synthesized map product.

CELL - Smallest of discrete elements that together form an image. A pixel.

CENTROID - The mathematical center point of a polygon or midpoint of a line.

CLASSIFICATION - A systematic arrangement in groups or categories according to established criteria.

COLUMN - Position along a row of a pixel. A vertical line of pixels. Row, column: Position in an array of a pixel (cell). Line, sample.

COLOR - Visible light of several wavelengths bounded by infrared (longer) and by ultraviolet (shorter). Humans can perceive about 20 different colors easily, as on a display.

COMPUTER EDIT - Editing a file by reviewing it on the computer and making necessary changes in the file.

CONTRAST ENHANCEMENT - Expanding the range of contrast, (DN) values, to the maximum available, for a better distinction between values.

CONTOUR - An imaginary line all points of which are at the same elevation.

COORDINATE - Numbers used to specify location from a known starting point, usually a set, in X and Y or easting and northing.

CORRELATION - To establish a mutual, repeatable relationship between types of data.

CREATED MAPS - (Derived) Maps attained by combining or modeling one or more layers of information.

DEM - Digital Elevation Model. Elevation information in raster format, from 1:24000 scale.

DIAL - Digital Image Analysis Lab located at WSU in Pullman.

DIGITAL FORMAT - Data stored as numbers.

DIGITIZING (PROCESS) - Using numerical characters to represent data.

DLG - Digital line graph, a digital computer file containing lists of point coordinates describing features from a topo map base.

DMA - Defense Mapping Agency. Elevation information in raster format, from 1:250000 scale.

DN NUMBER (VALUES) - Digital number. Value that represents the contrast level or grey level for that frequency. Measured as a value of reflectance. Low DN Values = Dark. High DN Values = Wht

EDGE MATCH -Comparison and graphic adjustment of features to obtain agreement or alignment of adjoining mapped areas.

ELECTROMAGNETIC SPECTRUM (RADIATION) - Radiation: Energy propagated through space in the form of advancing interaction between electric and magnetic fields. Spectrum: An ordered array of known electromagnetic radiations extending from the shortest cosmic rays, through gamma rays, X rays, ultraviolet radiation, visible radiation, infrared radiation and radio energy.

ERDAS - Earth Resource Data Analysis System. An image processing system.

FILES - Computer files, consisting of row, column (and DN value) that together form an image.

GIS - Graphic Information System. A layered system of computer mapping.

GPS - Global Positioning System that uses signals from satellites to compute position and elevation or ground.

GRAY SCALE - An ordering of shades of gray from black to white.

GRID - Uniform system of rectilinear (straight) lines.

GROUND TRUTHING - Field verifying relationship between remotely sensed data and field data.

HEADER FILE - File containing registration information for a data file.

HISTOGRAM - Graphical display of data which shows the frequency of occurrence (vertical) of individual measurements or values (horizontal). A frequency distribution.

HUE - That attribute of a color which makes it differ from gray of the same brilliance and which allows it to be classed as a color.

IMAGE FORMAT - Storing data in a series of rows and columns of pixels. See also raster.

IMAGE PROCESSING - Combining various images by direct arithmetic functions between corresponding pixels, or by other modeling techniques.

LANDSAT - Satellites that carry on board sensors that record images in various bands of the electromagnetic spectrum.

LATITUDE - Angular distance, north or south, measured from the earths equator.

LAYERS OF INFORMATION - Independent files of common information. eg: stream maps.

LEGEND - Explanatory list of the symbols on a map or chart.

LIGHT - Visible electromagnetic radiation (about 0.4 - 0.7 um). Visible light.

LINE COORDINATE FORMAT - Storing data as a series of eastings and northings. Or arcs and nodes (vectors).

LINE PRINTER MAPS - Maps printed on a line printer using symbols to represent a digital number; used for editing.

LONGITUDE - Angular distance measured on a great circle from the prime meridian @ Greenwich, England.

MAP EDIT - Comparing a plot against the original map for errors or omissions.

MODELING - Combining layers of information with influence attributes to form a final output map showing cumulative impacts.

MSS - A non-photographic imaging system which records spectral data. Also, an acronym for an american 3 band multispectral scanner.

MURIS - Multi-level Resource Information System. An umbrella system utilizing GIS, remote sensing, image processing, and accessing other data bases.

NODE - An intersection of two or more vectors (or arcs).

ORTHOPHOTO - A geometrically corrected photo, produced from a sterio plotter.

PANCHROMATIC - One band, black and white, satellite image.

PIXEL - Smallest of discrete elements that together form an image.

PIXEL HUNTING - Visually locating groups of similar spectral classes on a map.

PIXEL SIZE - Size, usually in meters, of pixels, usually in ground units.

PLOT - A graphic representation of a file printed by a graphics plotter.

PLOTTER - A printer that plots digital information graphically. Either in raster format or as a series of arcs and nodes.

PRINTOUT - A computer listing of the contents of a computer file.

RASTER - Pattern of sequentially and closely laid out parallel scanning lines (or rows) of dots (or pixels) that together form an image.

RECTIFICATION - The process of removing the effects of tilt, relief or other distortions from imagery, photos, or maps.

REGISTRATION POINTS - Points used for geographic location, correction and UTM correlation.

REMOTE SENSING - Acquiring information about an object (vegetation) without coming in direct contact with the object.

ROW - Horizontal line of samples (or pixels). Row, column: Position in an array of a pixel (cell). Line, sample.

SCANING - Using a sensor to read values for individual pixels on a grid basis.

SPATIAL - Spacially distributed map information.

SPATIAL (PROGRAMS) - Region One graphics display system.

SPECTRAL CLASS / CLASSIFICATION - Groupings of similar spectral signatures.

SPECTRAL SIGNATURE - Numerical measurements of the properties of an object at a series of wavelength intervals.

SPOT - Acronym for satellite probatoire d'observation de la terre (France).

TM - Acronym for thematic mapper, a 7 band multispectral scanner.

UTM - Universal Transverse Mercador (grid), a system of planned coordinates based upon 60 north-south trending zones, each 6 degrees of long wide, that circle the globe.

VECTOR - Two coordinates that form a line.

VEGETATIVE CLASS / CLASSIFICATION - A grouping of similar vegetative types.

VICAR/IBIS - Video Image Communication And Retrival / Image Based Information System. Image processing system used at WSU. Originally from space exploration program, developed at the NASA Jet Propulsion Lab in Calif.

WILBUR - WSU computer name. Compares to DG AOS exec program.

WSU - Washington State University, Pullman, WA. Has its own computing center.